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Methods used in Erecting a Modern Department Store in Chicago

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METHODS USED IN ERECTING A MODERN DEPARTMENT STORE IN CHICAGO

BY

HOPE EDWIN REUM

THESIS

FOR

DEGREE OF BACHELOR OF SCIENCE

IN

CIVIL ENGINEERING

COLLEGE OF ENGINEERING

UNIVERSITY OF ILLINOIS

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UNIVERSITY OF ILLINOIS

College of Engineering

May 24, 1913.

I recommend that the thesis prepared under my supervision by HOPE EDWIN REUM entitled Methods Used in Erecting a Modern Department Store in Chicago be approved as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

C. W. Malcolm

Asst. Professor of Structural Eng'g.

Recommendation approved

Ira O. Baker

Head of Department of

Civil Engineering.

246510

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INTRODUCTION.

The purpose of this thesis is to explain the methods used in the erection of a modern fireproof eighteen-story department store which was built in Chicago under rather unusual conditions. The construction of such a building presents problems of great interest to the architect, the engineer, and the contractor, because of the new ideas, modern methods, and advanced theories involved. The necessity of planning, designing, and successfully erecting in the shortest time a structure costing millions is no easy task, and calls for the highest order of skill on the part of all who are connected with such an enterprise.

In modern buildings of this type, there is generally outlined by the architects a general scheme of the building; for the purpose of giving advance information to the contractors as to the requirements of the project. Very frequently bidding and costs are materially affected by the conditions under which work must be done. The variable conditions and the needs of the owner or tenants are often such that many thousands of dollars are added to the costs by the requirements of the project as outlined in the general scheme. A summary of the scheme followed in the erection of the building under discussion follows.

GENERAL SCHEME.

The new building was constructed in two sections, the caissons for the first section being installed previous to the wrecking of the old first section. The first, or north section, consisted of the north 73 feet then occupied by the owner, including the bridges over Holden Court adjoining that section. See Plate I for the location of this court. The second section consisted of all parts of the old building which were not included in the first section.

Each section of the old building was used by the owner for merchandising, while the caissons were being installed. The south section was in continuous use until the new north section could be used. As soon as the caissons for the north section had been installed, the old section was wrecked and the new building was constructed. A period of two months elapsed between the practical completion of the first section and the sinking of the caissons for the second section. As soon as the new building had sufficiently advanced in construction, the old west wall of the Wabash Ave. building along the Court was removed in order that the necessary connections between the new and old building could be made by the various contractors. See Plate I.

On pages 3, 4, and 5 are shown photographs of the building in various stages of construction. On the left of the photograph on page 3, is shown the first or north section, and on the right the old north section. Page 4 shows the same constrction

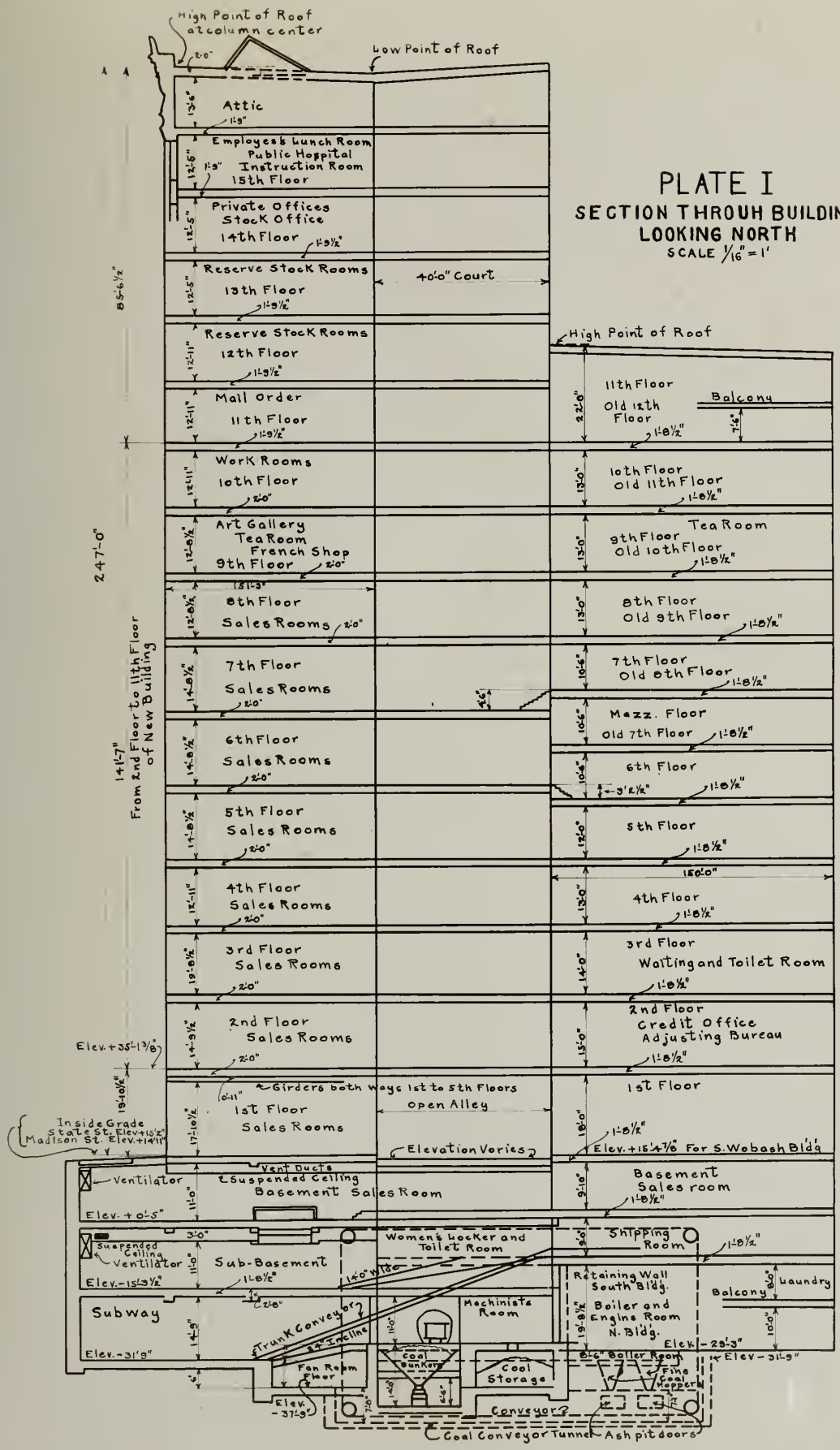

PLATE I

SECTION THROUGH BUILDING LOOKING NORTH

SCALE 1/16" = 1'

much further advanced. On page 5 is shown the north section completed with the south section under construction. The building is located on the corner of State and Madison Streets, the front being on State Street. By referring to these photographs, the reader can more fully appreciate the conditions under which the building was built.

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Mandel Brothers are completing one of America's
greatest dry goods store buildings

PREPARATIONS PREVIOUS TO THE SINKING OF THE CAISSONS.

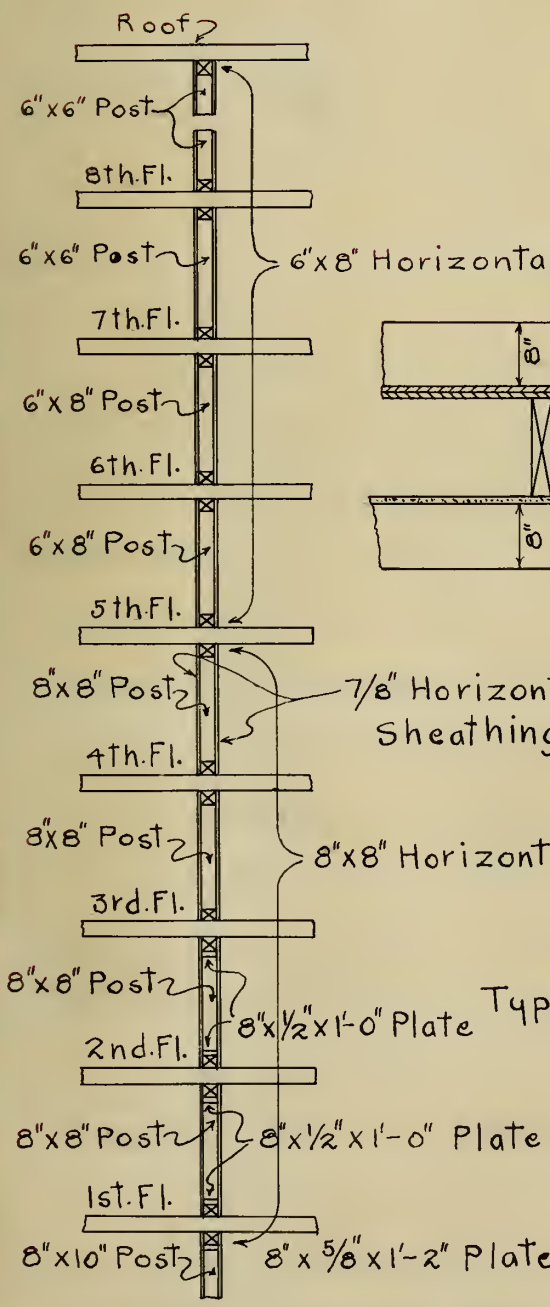
Previous to the building of a temporary partition which separated the old south from the old north section, certain preparations had to be made. It was necessary to clear out the old north basement. Electric conduits, water pipes and steam pipes were moved to the ceiling of the basement. The elevator machinery was all moved to the first floor, thus making this floor the end of the run for the elevators. Temporary toilets were installed in various parts of the basement for the use of the workmen. The above described work was also done in the basement of the adjoining department store, which is just north of the building.

Temporary Partitions.

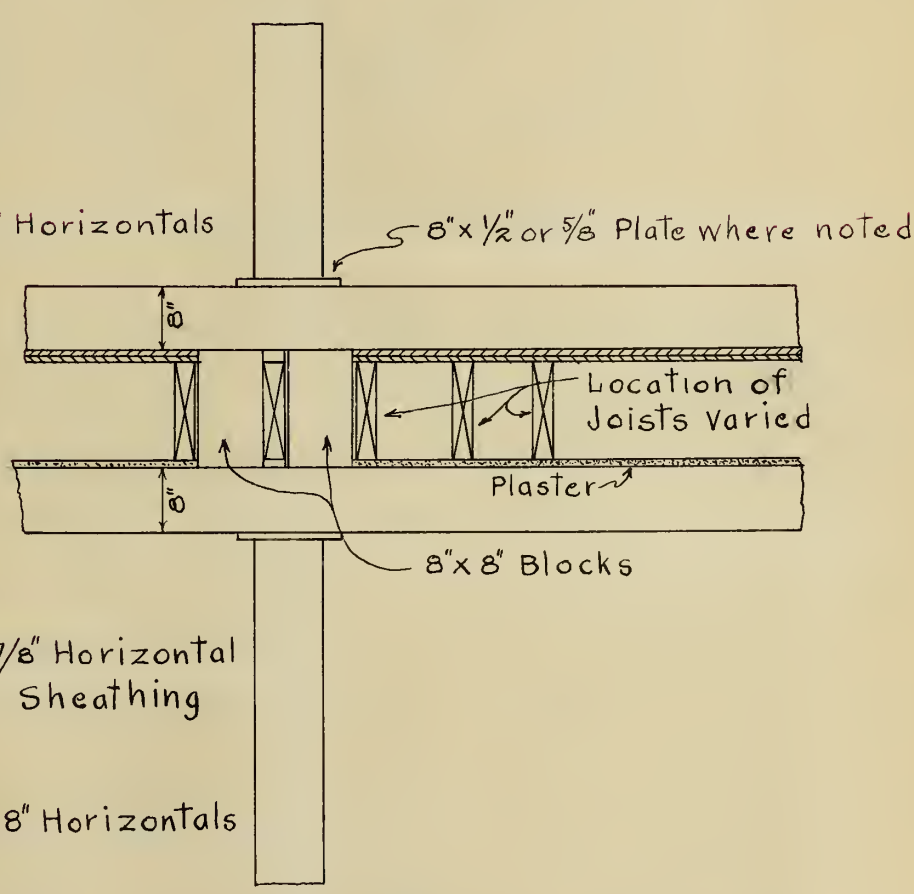
A temporary partition was erected in the basement, as mentioned in the preliminary preparations. It consisted of 8 by 10-inch posts, set five feet apart. The horizontal caps, were 8 by 8-inch timbers, which rested upon 8 in. by 1/2 in. by 1 ft. two in. wrought iron plates. The sheathing consisted of 7 by 5-1/2 inch matched and dressed timber with two thicknesses of building paper on each side of the post. See Plate II. At first this partition rested upon a cribbing consisting of I-beams, supported on heavy 12 by 12-inch timbers, this foundation in turn resting upon a clay stratum. After the basement-floor steel was put in place,

PLATE II

SKETCH OF TEMPORARY PARTITION BETWEEN NORTH AND SOUTH SECTIONS OF THE BUILDING



All Posts on 5'-0" Centers



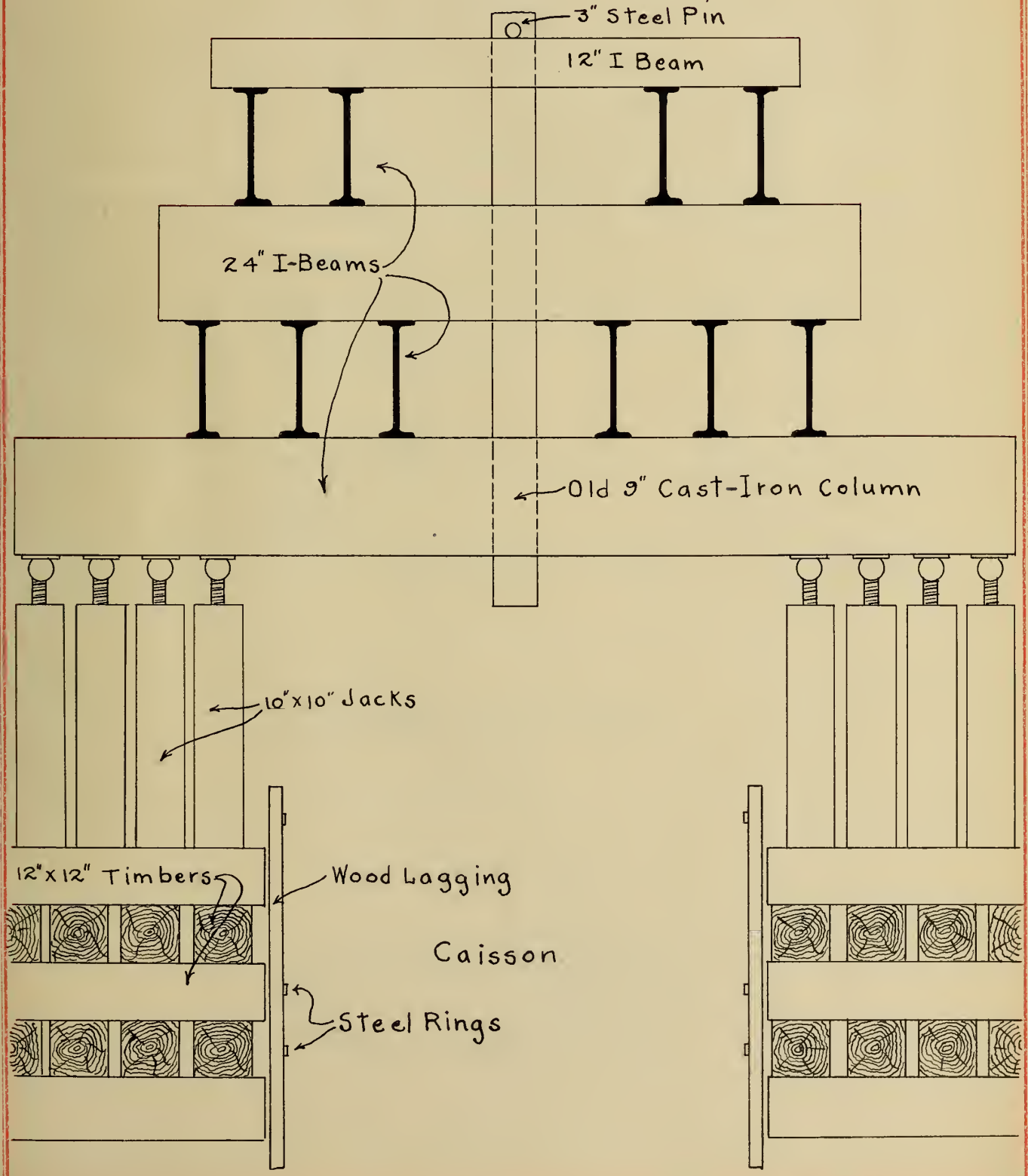
Typical Section 1st. to 8th. Floors

it rested upon the floor beams. Later, but before the sub-basement was excavated, a trench was dug to the sub-basement floor level, and the one story of the partition again rested upon timbers and I-beams. After the sub-basement was excavated, this partition was moved down to the elevation of the subway floor, and again rested upon I-beams and horizontal timbers. This operation was continued until the lowest level was reached. See Plate I.

Old Cast-Iron Column Cribbing.

Just previous to the caisson excavation, a cribbing foundation was built to support the first section of the old building. A cribbing consisting of I-beams and timbers was built under each column and at intervals along the party walls. The foundation for the cast-iron-column cribbing was about six feet below the old basement floor—or as previously stated for the temporary partition—to the clay stratum. Rows of 12 by 12-inch timbers running both ways were used for the lower courses. On top of these were placed short drums, the screw ends bearing upon twenty-four I-beams. All of these I-beams were twenty-four inches deep with the exception of the upper four which bore directly upon a three-inch steel pin. The upper four beams were twelve inches deep. See Plate III. A series of levels were taken on the columns and upon the party walls each day in order to detect any settlement. When a settlement was detected, the jackscrews were turned and the building brought to the proper elevation.

PLATE III
SKETCH OF GRIBBING FOR OLD CAST-IRON COLUMNS



Cribbing for the Party-Walls.

The cribbing which held up the north party-wall and the Holden Court wall was similar to that which supported the old cast-iron columns. Twenty-four-inch I-beams, spaced 2 feet apart, and supported on jacks and timbers, constituted the cribbing. As previously stated, this cribbing rested upon a clay foundation. See Plate IV. The old wall was then cut off a little below the old basement ceiling. The old footings were then removed and the caissons dug. See sketch below.

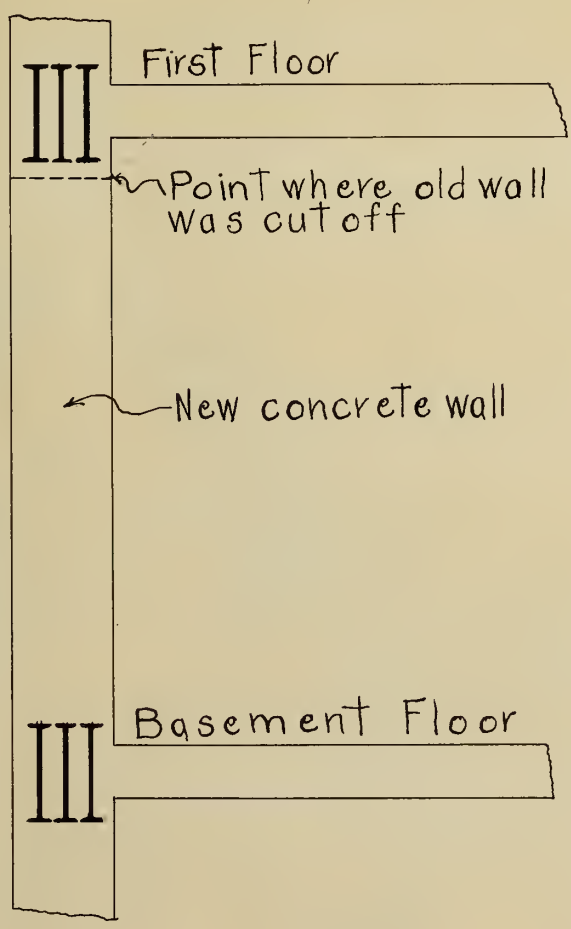
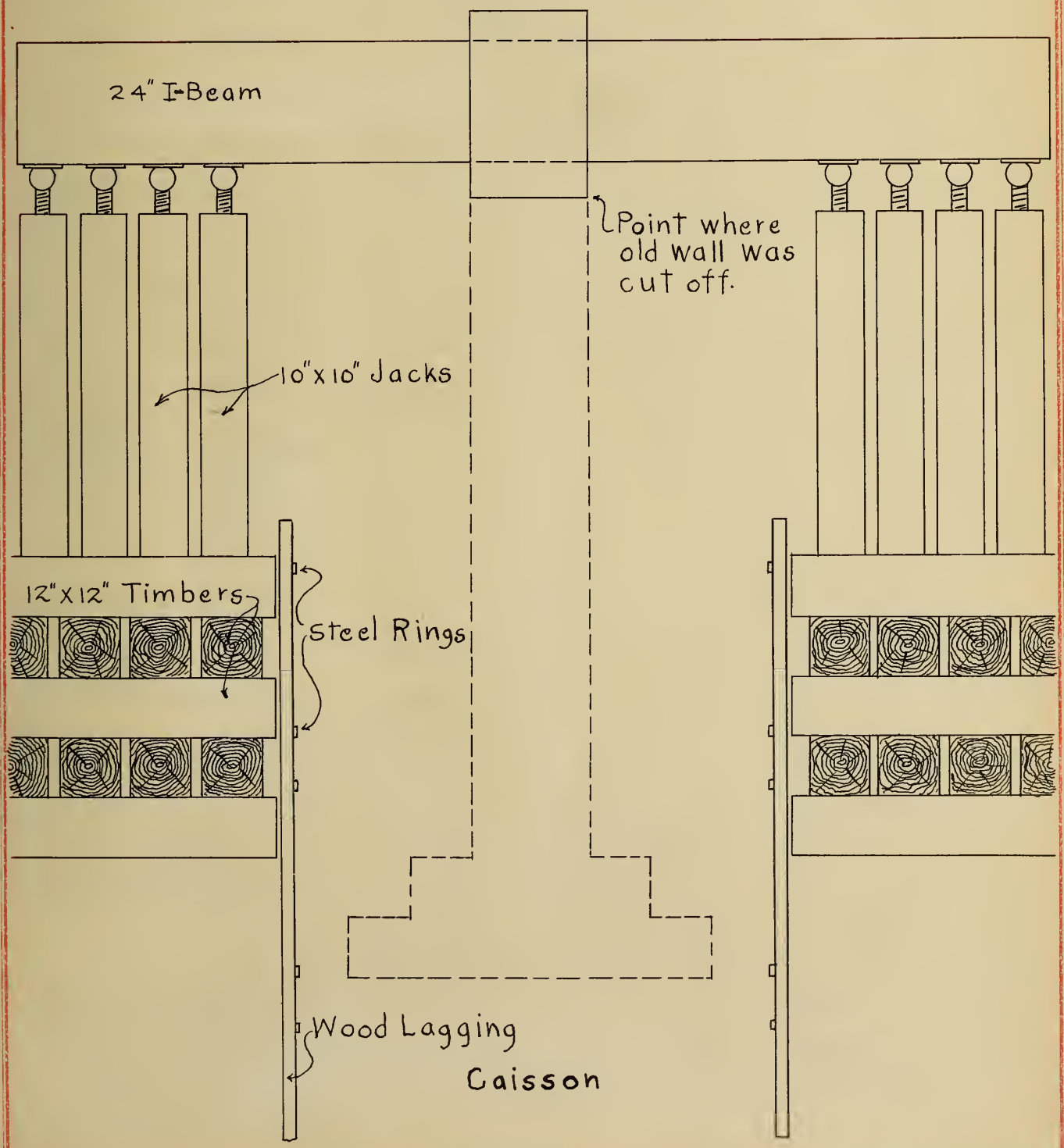


PLATE IV
SKETCH OF CRIBBING FOR PARTY-WALLS

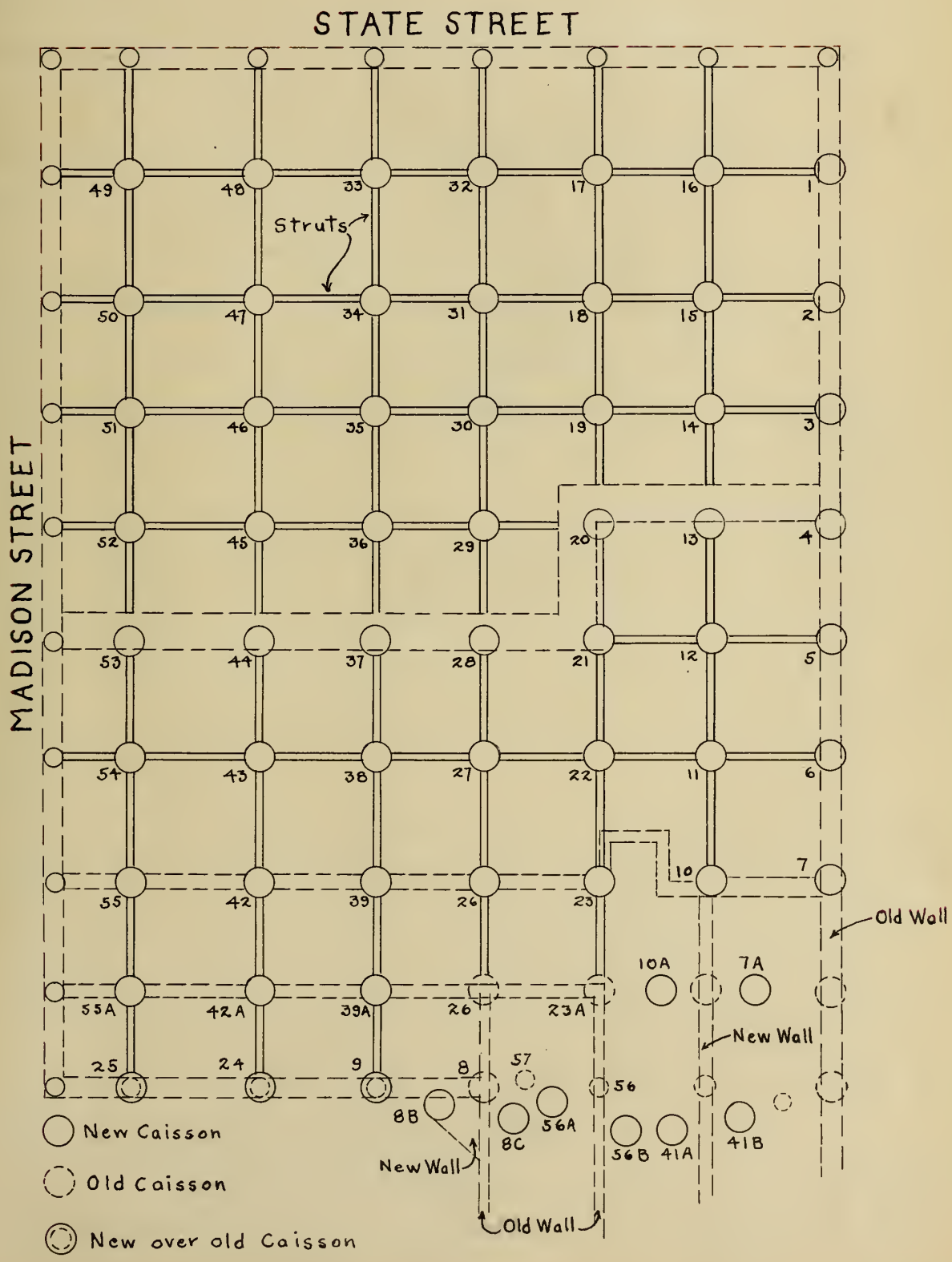


GENERAL METHOD OF EXCAVATING CAISSONS.

The caisson centers were first determined by a city surveyor. When his work was completed and the first section of the old building rested upon the cribbing, the general caisson excavation was begun. Just previous to the sinking of the caissons, a coffer-dam was constructed around the top of each caisson. The caisson lagging was first driven to the exact diameter of the caisson. Then a second row of lagging was driven two feet outside of the inner row. The ring-shaped space was excavated until solid blue clay was reached. The excavation was then filled to a point 12 inches above the general surface of the lot with freshly excavated blue clay. This blue clay was thoroughly puddled until it was solid and water-tight. Blue clay and dirt were excavated with shovels and picks while hard pan and rock were first drilled and then split up. As soon as the earth was excavated to the bottom of the top row of lagging, the rings were set in place and were bolted and wedged until each separate piece of lagging had a soil-bearing against the surrounding soil. Each set of lagging was plumbed. The process of excavating and plumbing the lagging was continued until the bottom had been reached. See data on caissons, pages 11 and 12 and Plate V.

The lagging, from the surface to the hard-pan, consisted of dressed and matched lumber 5-1/2 in. by 3 in. by 4 ft. long, while below the hard-pan stratum, the lumber was only two inches thick. Two thicknesses of lagging were used from the surface to a

PLATE V
CAISSON PLAN OF THE BUILDING
Scale 1/32" = 1'-0"



plane 20 feet below any adjoining walls.

A ventilating system was installed in each caisson during the excavation. A 2-inch flexible tube was used, and a continuous suction was maintained by means of a fan. The specification required that the ventilating system should be in operation fifteen minutes before any workmen were permitted to descend into the caisson and should be kept in operation as long as any excavation was being done.

Instead of using pumps, as is generally done in caisson work, buckets were used to remove the water. These buckets were raised and lowered by means of a steel cable, operated by an electric motor. This method is somewhat superior to the pump method when intermittent streams are encountered. In the first place, it takes some time to start the pumps during which time the water has some time to accumulate. In all underground work where springs are encountered, the water must be removed as speedily as possible. With the bucket system, as soon as a spring is encountered, the bucket can be lowered and the water bailed out as speedily as it flows in.

When bed-rock was reached, the bottom was thoroughly cleaned, and the superintendent went into the caisson and examined the rock to see if it was smooth and was typical of the bed-rock-stratum of that section of the country. Each alternate caisson was drilled to a depth of eight feet with a rock drill to make sure that the stratum was bed-rock. If the caisson was accepted, this hole was immediately filled with concrete.

When the caissons extended to hard-pan, they had their bottom diameter increased to twice the smallest diameter. The

side slopes were at an angle of sixty degrees to the vertical.

Caisson Data.

Caisson Number	Diam. of Caisson	Depth Below Street Level	Cu. Yds. of Excavation	Cu. Yds. of Concrete.
1	9'-8"	110'-3"	301	146
2	10'-8"	108'-7"	357	174
3	10'-0"	109'-0 1/8"	307	156
4	10'-0"	108'-3 5/8"	314	136
5	10'-0"	110'-0 5/8"	321	141
6	10'-4"	108'-10"	315	145
7	10'-8"	111'-3 1/8"	360	160
8B	5'-6"	70'-2"	28	13
8C	6'-0"	67'-11 1/2"	25	13
9	11'-8"	69'-0	247	22
10	10'-0"	110'-6 3/8"	324	148
11	8'-8"	110'-2 5/8"	269	111
12	9'-0"	110'-2 3/8"	290	119
13	8'-0"	108'-9 3/8"	228	93
14	8'-0"	108'-0 7/8"	210	102
15	8'-4"	106'-6"	219	107
16	9'-0"	108'-6"	285	129
17	9'-0"	106'-0 1/4"	254	123
18	8'-4"	108'-0"	224	111
19	8'-0"	108'-0"	208	102
20	8'-0"	108'-5 5/8"	207	91
21	8'-0"	109'-11 5/8"	265	118
22	8'-8"	107'-0 1/8"	236	105
23	10'-0"	109'-6 1/2"	321	121
24	10'-8"	71'-1 1/2"	214	21
25	12'-6"	69'-2 1/2"	272	20
26	10'-0"	107'-4 1/8"	314	115
27	8'-0"	107'-3 3/8"	206	89
28	8'-4"	106'-10 1/4"	219	95
29	8'-0"	109'-7 1/2"	210	105
30	8'-0"	106'-4 1/2"	205	99
31	8'-4"	105'-0 5/8"	219	103
32	9'-0"	106'-5 3/8"	236	134
33	10'-4"	107'-8 1/8"	333	172
34	11'-8"	106'-7 3/8"	413	209
35	11'-4"	110'-5 3/4"	404	192
36	11'-4"	106'-11 1/8"	392	205
37	11'-8"	107'-0"	412	196
38	11'-8"	106'-10 3/4"	415	196
39	11'-8"	107'-5 1/8"	408	170
40	6'-4"	106'-11 1/2"	85	61
41A	5'-3"	107'-8 1/2"	60	33
41B	5'-3"	107'-1"	59	43

Caisson Data. (Cont.)

Caisson Number	Diam. of Caisson	Depth Below Street Level	Cu. Yds. of Excavation	Cu. Yds. of Concrete.
42	9'-8"	109'-4 3/4"	299	120
42A	4'-0"	108'-4 1/2"	47	8
43	8'-4"	107'-2 3/8"	220	100
44	8'-0"	106'-8 3/8"	204	90
45	8'-0"	107'-9 1/2"	205	104
46	8'-0"	110'-1 7/8"	210	109
47	8'-4"	109'-1 1/8"	227	116
48	9'-4"	104'-3 1/2"	266	130
49	9'-0"	105'-0 1/2"	250	128
50	9'-0"	106'-11 1/2"	254	128
51	8'-8"	105'-9 3/8"	237	157
52	8'-8"	105'-2 1/2"	233	116
53	8'-8"	106'-2 1/2"	237	105
54	8'-8"	106'-2 1/2"	235	105
55	10'-8"	108'-9"	360	134
55A	4'-0"	107'-6 1/4"	48	8
56A	5'-3"	68'-3"	28	3
56B	5'-3"	69'-2 1/2"	28	3

General Specifications for Concrete.

The following requirements, which are taken from the architects specifications, required that the concrete materials used in filling the caissons fulfill the following conditions:-

CEMENT.

The cement shall be of any brand of Portland cement which fulfills the following requirements:

Specific Gravity.

Thoroughly dried cement not less than 3.10.

Fineness.

Residue by weight, not less than 8 percent on the No.100 sieve, and not more than 25 percent on the No.200 sieve.

Time of Setting.

Initial set not less than 30 minutes, but shall set hard in not less than 1 hour or more than 5 hours.

Tensile Strength.

Neat cement 24 hours in moist air, not less than 175 lb. per square inch. One part cement to three parts sand by volume seven days—one day moist air, six days water, not less than 175 lb. per square inch.

Constancy of volume.

Pats of neat cement three inches in diameter and one-half an inch thick at the center and tapering to a thin edge shall show no signs of distortion, cracking or disintergration under the boiling test.

All cement shall be tested before being delivered to the building at the expense of the contractor, by an engineer who is approved by the architects. No cement which fails in any of these requirements shall be delivered. Each bag or barrel shall have the inspectors approval before it is delivered, and reports of the tests made by the engineer shall be furnished to the architects before the cement is used.

SAND.

Sand shall be any clean, sharp, torpedo sand, free from all foreign substances and shall be washed if necssary to reach this

conditions, or, if he prefers, the contractor will be permitted to use clean limestone screenings.

STONE.

Stone shall be clean, sound broken limestone, or crushed, screened and washed gravel of random sizes varying from 1/2 to 1-1/2 inches in diameter, evenly graded and mixed.

GRANITE.

Granite for the top-filling in caissons shall be clean, selected granite screenings not to exceed 1/4-inch.

The concrete shall be mixed in an approved type of batch-mixer operated by electric power. The proportions are 1:3:5 by volume for the caissons. The top-filling for all the caissons shall be 5 parts cement and 7 parts of granite screenings by volume. The concrete shall be quaking when being poured.

CONCRETING THE CAISSONS.

The concrete was dumped from cars into the shaft, care being taken that it did not hit the sides of the caisson. As soon as the outer edges of the concrete had reached the level of the ring, a workman descended and removed the ring and leveled off the concrete. This process was continued until the concrete had reached the required level for the underside of the granite top-filling. In some cases where the lagging showed sign of bulging out, the rings were left permanently in place. The concreting of the caissons was done by three shifts of workmen, each shift working

eight hours a day, including Sundays and holidays.

The granite top-filling was 18 inches thick, extending from the underside of the lower grillage-beams to the top of the concrete. After the granite top-filling was leveled up and made the required thickness, the lower courses of the grillage were put in. Each course of grillage consisted of seven 8-inch I-beams, spaced 8 inches apart. The lower grillage was set in place and was grouted in solidly to a point one inch above the bottom of the beams with a grout composed of 1 part Portland cement to 1 1/2 parts of granite screenings by volume. After the grout had set, the space between the beams and the lagging enclosing the caisson was filled solidly to the top of the grillage with a grout composed of one part Portland cement to 2 parts of torpedo sand. The second course of grillage-beams was placed at right angles to the first set and was grouted in a similar manner, after the concrete in the lower course had thoroughly set.

After the two courses of the grillage were in place, the structural steel erector set the column bases and stools. The bases rested on iron wedges located at the four corners. The elevation and location of the bases were then checked by the city surveyor before any further work could be done. The elevation of the bottom of the bases was 47 ft-4 in. below the street level. After the location of the bases was approved, the grillage-stools were filled with granite top-filling. After this had hardened, the upper surface of the grillage-beams and the outside of the stool were encased with two inches of stone concrete, as previously specified for the caissons. Before this had hardened, the concrete was coated with one-half an inch of cement plaster, consisting of

1 part Portland cement to 2 parts of torpedo sand.

WRECKING.

As soon as the caissons had been installed, the first section was ready to be wrecked. All merchandise and supplies were transferred to the 2nd. section and to the Wabash Avenue building. The wrecking was started from the top. Runways from the street were first installed in various parts of the building. These enabled teamsters to drive their wagons in and place them directly under a chute. A series of these chutes was placed on each floor, extending from the roof to the first floor. These chutes were used to facilitate the handling of the small materials, such as bricks, etc.

The roof was first removed and hauled away. Following this, the entire building was wrecked, the materials being removed piece by piece. All material was cleaned, the old mortar was removed from the bricks, nails were pulled out of lumber, etc. It was then removed to a wrecking yard where it was sold at reduced prices. Everything which came from an old building was handled by these wrecking concerns.

STEEL ERECTION.

When the caissons had been installed and the building wrecked, the steel floor-beams and girders were erected from the

first floor to the roof. The columns were set, however, from the lowest level, which is a little below the subway floor. Later, as the general excavation was being completed, the basement, sub-basement and subway floor-beams and girders were put in place.

The machinery used for the erection consisted of three derricks—two large ones and one smaller one. The large cranes had a radius of 60 feet, while the smaller ones had a radius of 40 feet. These large derricks were placed at the ends of the building, while the smaller one was placed in the center. This scheme enabled the erector to reach any point of the building.

The heaviest floor-beams, with the exception of the wall-girders which were built-up sections consisting of a web plate and four angles, were 24-inch I-beams. See Plate VI. As the columns were built of two-story lengths, the derricks had to be shifted every two floors. The steel columns were first erected, the ones farthest away being erected first. Following this, the floor-beams and girders were placed. When two floors were completed, the derricks were shifted. The small crane was used to raise the two larger ones, and when these were securely fastened, the smaller one was raised and fastened to its new position. The cross-section of the columns varied, which was due to their unequal spacing. Heavy sections were used, some consisting of ten plates, three channels and four angles. See Plates VII and VIII.

All rivets were inspected by the superintendent. On an average, ten percent of the rivets had to be redriven. This was mainly due to the fact that the different riveting squads would race each other in order to see which squad could drive the most

PLATE VI

FIRST FLOOR STEEL FRAMING PLAN

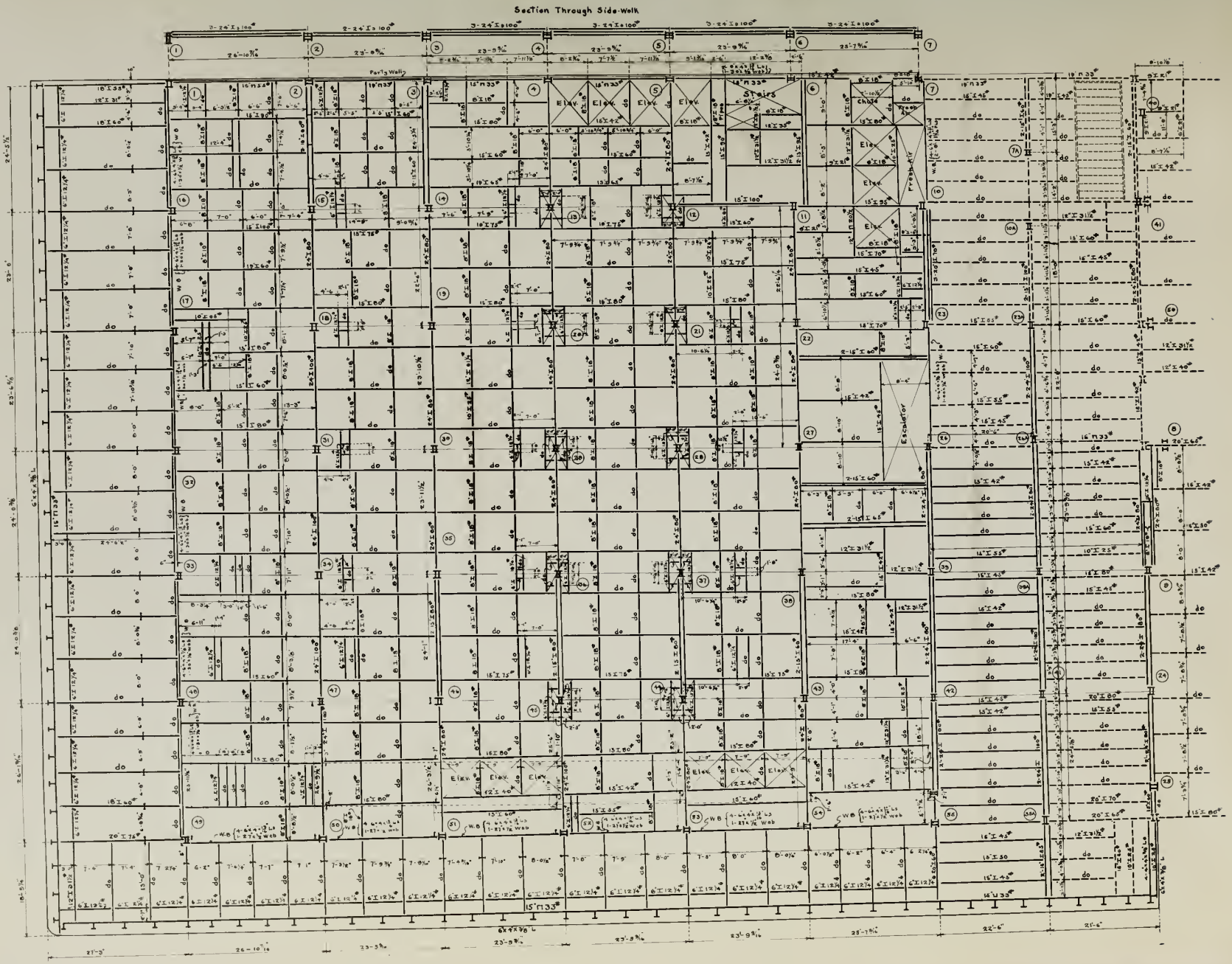


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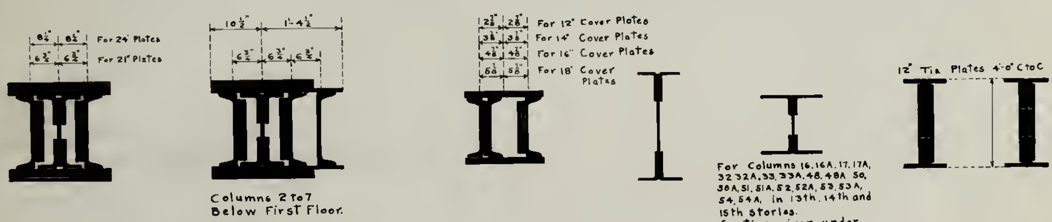
PLATE VII

COLUMN SCHEDULE

FLOOR \ COL. NO.	1	2	3	4	5	6	7	8	9	10
ROOF								2-12 C 25 2-14×3/8 Pls.		2-12 C 25 2-14×9/16 Pls.
ATTIC	2-12 C 40 2-22×7/8 Pl.	2-12 C 40 2-14×7/8 Pls.	2-12 C 40 2-14×13/16 Pls.			2-12 C 40 2-14×7/8 Pls.	2-12 C 35 2-14×11/16 Pls.		2-12 C 25 2-14×1/4 Pls.	
15TH	2-12 C 40 4-14×11/16 Pls.							2-12 C 30 2-14×9/16 Pls.	2-12 C 36 2-14×7/8 Pls.	2-12 C 35 2-14×3/8 Pls.
14TH	2-12 C 40 4-16×11/16 Pls.	2-12 C 40 4-16×13/16 Pls.	2-12 C 40 4-16×3/4 Pls.			2-12 C 40 2-16×7/8 Pls. 2-16×11/16 Pls.	2-12 C 40 2-16×9/16 Pls.			
13TH								2-12 C 40 4-14×11/16 Pls.	2-12 C 40 2-14×3/4 Pls.	2-12 C 40 2-14×11/16 Pls.
12TH	2-12 C 40 4-16×3/8 Pls. 2-11×7/8 Pls.	2-12 C 40 4-16×11/16 Pls. 4-11×1/2 Pls.	2-12 C 40 4-16×3/4 Pls. 4-11×1/2 Pls.			2-12 C 40 4-16×7/8 Pls. 2-11×3/4 Pls.	2-12 C 40 4-18×3/4 Pls. 2-11×1/2 Pls. 2-11×7/16 Pls.			
11TH								2-12 C 40 4-14×7/8 Pls.	2-12 C 40 4-14×5/8 Pls. 2-11×7/8 Pls.	2-12 C 40 4-14×9/16 Pls.
10TH	2-12 C 40 6-16×9/16 Pls. 2-11×11/16 Pls. 2-11×3/4 Pls.	2-12 C 40 6-16×11/16 Pls. 4-11×3/4 Pls.	2-12 C 40 6-16×5/8 Pls. 4-11×3/4 Pls.	SAME AS COL. 3	SAME AS COL. 3	2-12 C 40 6-16×11/16 Pls. 4-11×11/16 Pls.	2-12 C 40 6-16×5/8 Pls. 2-11×11/16 Pls. 2-11×3/8 Pls.			
9TH								2-12 C 40 6-14×11/16 Pls.	2-12 C 40 4-6×3/4 Pls. 4-11×5/8 Pls.	2-12 C 40 4-14×3/4 Pls.
8TH	6-18×13/16 Pls. 2-11×5/8 Pls. 2-11×5/8 Pls. 2-12 C 40	2-12 C 40 6-18×7/8 Pls. 4-11×11/16 Pls.	2-12 C 40 6-18×13/16 Pls. 4-11×5/8 Pls.			2-12 C 40 6-18×7/8 Pls. 4-11×9/16 Pls.	2-12 C 40 6-18×13/16 Pls. 4-11×5/8 Pls.			
7TH								2-15 C 40 6-14×3/4 Pls.	2-12 C 40 6-16×11/16 Pls. 4-11×11/16 Pls.	2-12 C 48 4-16×5/8 Pls. 2-11×7/8 Pls.
6TH	6-21×7/8 Pls. 2-14×11/16 Pls. 2-15 C 50	2-15 C 55 6-21×7/8 Pls. 4-14×5/8 Pls.	2-16 C 55 6-21×7/8 Pls. 2-14×7/8 Pls.			2-15 C 55 6-21×7/8 Pls. 4-14×1/2 Pls.	2-15 C 55 6-21×7/8 Pls. 2-14×7/8 Pls.	TRUSS		
5TH								2-18×3/4 Pls. 8-6×4×3/4 Ls 4-6×3/4 Pls. 4-16½×5/8 Pls.	2-15 C 55 6-16×3/4 Pls. 6-14×7/8 Pls.	2-12 C 40 4-16×3/4 Pls. 2-11×7/8 Pls.
4TH	6-21×7/8 Pls. 4-14×3/4 Pls. 2-15 C 55	2-15 C 55 8-21×7/8 Pls. 4-13×11/16 Pls. 1-14½×7/8 Pl. 4-6×4×7/8 Ls	2-15 C 55 6-24×7/8 Pls. 4-14×13/16 Pls.			2-15 C 55 6-21×7/8 Pls.	2-15 C 55 6-21×7/8 Pls. 4-14×7/8 Pls.			
3RD								2-18×3/4 Pls. 8-6×4×3/4 Ls 4-6×3/4 Pls. 4-16½×5/8 Pls.	2-15 C 55 6-21×7/8 Pls. 4-13×7/8 Pls. 1-14½×7/8 Pl. 4-6×4×11/16 Ls	2-16 C 65 6-18×5/8 Pls. 2-14×7/16 Pls. 2-14×7/8 Pls.
2ND	2-15 C 88 4-13×13/16 Pls. 1-14½×7/8 Pl. 4-6×4×5/8 L 6-21×9/16 C	2-16 C 55 6-21×7/8 Pls. 4-13×7/8 Pls. 2-14½×5/16 Pls. 4-6×4×7/8 Ls	2-16 C 55 6-21×7/8 Pls. 4-13×7/8 Pls. 1-14½×7/8 Pl. 4-6×4×5/8 Ls			2-15 C 55 6-21×7/8 Pls. 4-13×7/8 Pls. 1-14½×7/8 Pl. 4-6×4×11/16 Ls	2-15 C 55 8-21×7/8 Pls. 4-13×7/8 Pls. 1-14½×7/8 Pl. 4-6×4×3/4 Ls			
1ST								2-18×3/4 Pls. 8-6×4×3/4 Ls 4-6×3/4 Pls. 4-16½×5/8 Pls.	2-15 C 55 6-24×7/8 Pls. 6-13×13/16 Pls. 1-14½×7/8 Pl. 4-6×4×7/8 Ls	2-18 C 55 6-21×3/4 Pls. 6-14×7/8 Pls.
BSMT	2-18 C 55 8-21×7/8 Pls. 4-13×13/16 Pls. 1-14½×7/8 Pl. 4-6×4×7/8 L 2-12 C 33 1-21×5/8 Pl.	2-15 C 55 3-27×7/8 Pls. 4-21×7/8 Pls. 1-14½×7/8 Pls. 4-13×7/8 Pls. 4-6×4×7/8 Ls 1-15 C 33	2-15 C 55 2-27×7/8 Pls. 4-21×7/8 Pls. 1-14½×7/8 Pl. 4-13×3/4 Pls. 4-6×4×1/2 Ls 1-15 C 30			2-15 C 55 2-22×7/8 Pl. 4-21×7/8 Pl. 1-14½×7/8 Pl. 4-13×3/4 Pls. 4-6×4×11/16 Ls 1-15 C 33	2-15 C 55 2-27×7/8 Pls. 4-21×7/8 Pls. 1-14½×7/8 Pl. 4-13×7/8 Pls. 4-6×4×11/16 Ls 1-15 C 33			
S.BSMT								2-16×3/4 Pls. 6-6×4×3/4 Ls 4-6×3/4 Pls. 4-16½×11/16 Pls.	2-15 C 55 6-24×7/8 Pls. 6-13×13/16 Pls. 2-14½×11/16 Pls. 4-6×4×7/8 Ls	2-15 C 55 6-21×7/8 Pls. 6-13×13/16 Pls. 1-14½×7/8 Pl. 4-6×4×3/4 Ls
SUBWAY										

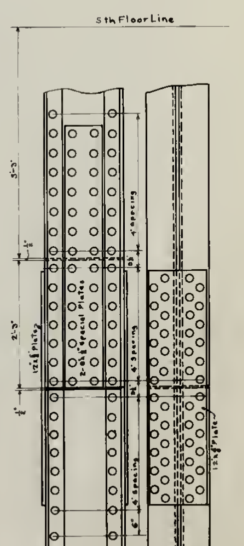
FLOOR \ COL. NO.	11	12	13	14	15	16	17	18	19	20	21
ROOF	2-12 C 40 2-14×3/4 Pls.	2-12 C 40 2-14×3/8 Pls.									2-12 C 40 2-14×3/8 Pls.
ATTIC	2-12 C 40 2-14×13/16 Pls.	2-12 C 40 2-14×3/4 Pls.	2-12 C 25 2-14×1/2 Pls.	2-12 C 25 2-14×1/2 Pls.	2-12 C 25 2-14×1/2 Pls.	8-6×4×7/16 Ls 2-22×9/16 Pls.	8-6×4×7/16 Ls 2-22×9/16 Pls.		2-12 C 25 2-14×1/2 Pls.	2-12 C 25 2-14×1/2 Pls.	2-12 C 40 2-14×3/4 Pls.
15TH	2-12 C 40 4-14×9/16 Pls.	2-12 C 40 4-14×1/2 Pls.	2-12 C 25 2-14×5/16 Pls.	2-12 C 25 2-14×5/16 Pls.	2-12 C 25 2-14×5/16 Pls.	8-5×3½×3/8 Ls 2-12×5/8 Pls.	8-5×3½×3/8 Ls 2-12×5/8 Pls.		2-12 C 25 2-14×5/16 Pls.	2-12 C 25 2-14×5/16 Pls.	2-12 C 40 4-14×1/2 Pls.
14TH											
13TH	2-12 C 40 4-14×5/8 Pls. 2-11×1/2 Pls.	2-12 C 40 2-14×7/8 Pls. 2-14×11/16 Pls.	2-12 C 35 2-14×5/8 Pls.	2-12 C 35 2-14×9/16 Pls.	2-12 C 40 2-14×9/16 Pls.	8-6×4×3/8 Ls 2-12×5/8 Pls. GIRDER	8-6×4×3/8 Ls 2-12×5/8 Pls. GIRDER		2-12 C 35 2-14×9/16 Pls.	2-12 C 35 2-14×9/16 Pls.	2-12 C 40 4-14×3/4 Pls.
12TH											
11TH	2-12 C 40 4-14×3/4 Pls. 2-11×7/8 Pls.	2-12 C 40 4-14×13/16 Pls. 2-11×9/16 Pls.	2-12 C 40 4-14×1/2 Pls.	2-12 C 40 4-14×1/2 Pls.	2-12 C 40 4-14×9/16 Pls.	3-12 C 40 4-14×3/4 Pls.	3-12 C 40 4-14×11/16 Pls.		2-12 C 40 4-14×1/2 Pls.	2-12 C 40 4-14×1/2 Pls.	2-12 C 40 4-14×3/4 Pls. 2-11×5/8 Pls.
10TH											
9TH	2-12 C 40 4-14×7/8 Pls. 4-11×9/16 Pls.	2-12 C 40 4-14×7/8 Pls. 4-11×1/2 Pls.	2-12 C 40 4-14×3/4 Pls.	2-12 C 40 4-14×3/4 Pls.	2-12 C 40 4-14×5/8 Pls. 2-11×1/2 Pls.	3-12 C 40 2-14×11/16 Pls. 2-14×3/8 Pls. 2-11×9/16 Pls.	3-12 C 48 2-14×5/8 Pls. 2-14×13/16 Pls. 2-11×9/16 Pls.	SAME AS COL. 15	2-15 C 40 4-14×1/2 Pls. 2-14×1/2 Pls.	2-12 C 40 4-14×3/4 Pls.	2-12 C 40 4-14×7/8 Pls. 2-11×1/2 Pls. 2-11×9/16 Pls.
8TH											
7TH	2-12 C 40 6-16×5/8 Pls. 2-11×11/16 Pls. 2-11×3/4 Pls.	2-12 C 40 4-16×7/8 Pls. 2-11×11/16 Pls. 2-11×3/8 Pls.	2-12 C 40 4-16×3/4 Pls. 2-11×1/2 Pls.	2-12 C 40 4-16×3/4 Pls. 2-11×1/2 Pls.	2-12 C 40 4-16×11/16 Pls. 2-11×7/8 Pls.	3-12 C 40 2-16×7/8 Pls. 2-16×13/16 Pls. 2-11×3/8 Pls.	3-12 C 40 4-16×13/16 Pls. 2-11×7/8 Pls.		2-15 C 40 4-14×5/8 Pls. 2-14×7/8 Pls.	2-12 C 40 4-16×3/4 Pls. 2-11×1/2 Pls.	2-12 C 40 4-16×7/8 Pls. 2-11×11/16 Pls. 2-11×3/4 Pls.
6TH											
5TH	2-12 C 40 6-16×3/4 Pls. 4-11×7/8 Pls.	2-12 C 40 6-16×11/16 Pls. 4-11×11/16 Pls.	2-12 C 40 4-16×3/4 Pls. 2-11×1/2 Pls. 2-11×7/16 Pls.	2-12 C 40 4-16×3/4 Pls. 4-11×1/2 Pls.	2-12 C 40 4-16×3/4 Pls. 4-11×5/8 Pls.	3-12 C 40 4-16×7/8 Pls. 3-11×7/8 Pls.	3-12 C 40 4-16×7/8 Pls. 3-11×3/4 Pls.		2-15 C 40 4-14×7/8 Pls. 2-14×15/16 Pls.	2-12 C 40 4-16×3/4 Pls. 2-11×1/2 Pls. 2-11×7/16 Pls.	2-12 C 40 6-16×11/16 Pls. 2-11×11/16 Pls. 2-11×3/4 Pls.
4TH											
3RD	2-12 C 40 6-16×15/16 Pls. 4-11×7/8 Pls.	2-12 C 40 6-16×13/16 Pls. 4-11×13/16 Pls.	2-12 C 48 4-16×7/8 Pls. 4-11×11/16 Pls.	2-12 C 40 4-16×7/8 Pls. 2-11×11/16 Pls. 2-11×3/4 Pls.	2-12 C 40 6-16×5/8 Pls. 4-11×3/4 Pls.	3-12 C 40 6-18×7/8 Pls. 4-11×11/16 Pls.	3-12 C 40 6-18×7/8 Pls. 3-11×13/16 Pls.		2-15 C 40 6-14×11/16 Pls. 4-14×1/2 Pls.	2-12 C 40 4-16×7/8 Pls. 4-11×11/16 Pls.	2-12 C 40 6-16×13/16 Pls. 2-11×13/16 Pls. 2-11×3/8 Pls.
2ND											
1ST	2-16 C 65 6-16×7/8 Pls. 4-14×7/8 Pls.	2-16 C 55 6-16×13/16 Pls. 4-14×3/4 Pls.	2-12 C 48 6-16×11/16 Pls. 4-11×3/4 Pls.	2-12 C 40 6-16×3/4 Pls. 2-11×5/8 Pls. 2-11×11/16 Pls.	2-12 C 40 6-16×3/4 Pls. 4-11×13/16 Pls.	3-12 C 40 6-18×7/8 Pls. 4-11×11/16 Pls.	3-12 C 40 6-18×7/8 Pls. 4-11×11/16 Pls.		2-15 C 40 6-14×11/16 Pls. 2-14×3/4 Pls. 2-14×13/16 Pls.	2-12 C 40 6-16×11/16 Pls. 4-11×3/4 Pls.	2-15 C 55 6-16×3/4 Pls. 4-14×7/8 Pls.
BSMT											
S.BSMT	2-15 C 56 6-18×1 Pls. 4-14×13/16 Pls.	2-16 C 65 6-18×7/8 Pls. 2-14×13/16 Pls. 2-14×7/8 Pls.	2-15 C 65 6-16×3/4 Pls. 4-14×13/16 Pls.	2-15 C 55 6-16×3/4 Pls. 4-14×7/8 Pls.	2-15 C 55 6-16×3/4 Pls. 4-14×13/16 Pls.	2-15 C 55 6-18×1 Pls. 2-14×3/4 Pls. 2-14×11/16 Pls.	2-15 C 55 6-18×7/8 Pls. 2-14×13/16 Pls. 2-14×7/8 Pls.		2-15 C 55 6-16×3/4 Pls. 4-14×13/16 Pls.	2-15 C 65 6-16×3/4 Pls. 4-14×13/16 Pls.	2-15 C 55 6-18×1 Pls. 2-14×3/4 Pls. 2-14×11/16 Pls.
SUBWAY											



Columns 2 to 7 Below First Floor.

For Columns 16, 16A, 17, 17A, 32, 32A, 33, 33A, 48, 48A, 50, 50A, 51, 51A, 52, 52A, 53, 53A, 54, 54A, in 13th, 14th and 15th Stories.
Section given under Columns 16, 17, etc. include 16A, 17A, etc.

FLOOR \ COL. NO.	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ROOF	2-12 C 40 2-14×3/8 Pls.	2-12 C 25 2-14×1/4 Pls.												
ATTIC	2-12 C 40 2-14×3/4 Pls.		2-16 C 83 2-21×1/2 Pls.	2-15 C 35 4-21×1/2 Pls.	2-12 C 25 2-14×1/4 Pls.	2-12 C 25 2-14×1/2 Pls.	2-12 C 25 2-14×1/4 Pls.	2-12 C 25 2-14×1/4 Pls.		2-12 C 26 2-14×1/4 Pls.	8-6×4×7/16 Ls 2-22×9/16 Pls.			2-12 C 25 2-14×1/4 Pls.
15TH	2-12 C 40 4-14×9/16 Pls.	2-12 C 30 2-14×7/16 Pls.	2-16 C 33 2-21×1/2 Pls.	3-15 C 40 2-21×5/8 Pls. 2-32×5/8 Pls.	2-12 C 25 2-14×5/16 Pls.	2-12 C 25 2-14×5/16 Pls.	2-12 C 25 2-14×5/16 Pls.	2-12 C 25 2-14×5/16 Pls.		2-12 C 25 2-14×5/16 Pls.	8-5×3½×3/8 Ls 2-12×5/8 Pls.			2-12 C 25 2-14×5/16 Pls.
14TH														
13TH	2-12 C 40 4-14×5/8 Pls. 2-11×1/2 Pls.	2-12 C 40 2-14×3/8 Pls.	2-15 C 40 4-21×11/16 Pls.	3-16 C 55 2-21×13/16 Pls. 2-32×13/16 Pls.	2-12 C 35 2-14×9/16 Pls.	2-12 C 36 2-14×3/8 Pls.	2-12 C 36 2-14×5/8 Pls.	2-12 C 35 2-14×5/8 Pls.		2-12 C 35 2-14×11/16 Pls.	8-6×4×3/8 Ls 2-12×5/8 Pls. GIRDER	GIRDER		2-12 C 35 2-14×5/8 Pls.
12TH														
11TH	2-12 C 40 4-14×3/4 Pls. 2-11×13/16 Pls.	2-12 C 40 4-14×5/8 Pls.	2-15 C 40 4-21×11/16 Pls. GIRDER 2-16 C 40 4-21×5/8 Pls.	2-16 C 56 4-21×13/16 Pls. 2-14×3/8 Pls.	2-12 C 40 4-14×1/2 Pls.	2-12 C 40 2-14×5/8 Pls. 2-14×7/16 Pls.	2-12 C 40 2-14×5/8 Pls. 2-14×7/16 Pls.	2-12 C 40 2-14×5/8 Pls. 2-14×7/16 Pls.	SAME AS COL. 28	2-12 C 40 4-14×9/16 Pls.	3-12 C 40 4-14×3/4 Pls.	SAME AS COL. 32	SAME AS COL. 31	2-12 C 40 4-14×1/2 Pls.
10TH														
9TH	2-15 C 40 4-14×5/8 Pls. 4-14×11/16 Pls.	2-12 C 40 4-14×5/8 Pls. 2-11×1/2 Pls.	2-15 C 40 4-21×11/16 Pls.	2-15 C 55 4-21×7/8 Pls. 4-14×1/2 Pls.	2-12 C 40 4-14×9/16 Pls. 2-11×7/16 Pls.	2-12 C 40 4-14×9/16 Pls. 2-11×11/16 Pls.	2-12 C 48 4-14×9/16 Pls. 2-11×1/2 Pls.	2-12 C 40 4-14×9/16 Pls. 2-11×1/2 Pls.		2-12 C 40 4-14×9/16 Pls. 2-11×11/16 Pls.	3-12 C 40 4-14×3/4 Pls. 2-11×9/16 Pls.			2-15 C 40 4-14×1/2 Pls. 2-14×1/2 Pls.
8TH														
7TH	2-15 C 40 6-14×5/8 Pls. 4-14×11/16 Pls.	2-12 C 40 4-16×3/4 Pls. 2-11×7/8 Pls.	2-15 C 40 4-21×3/4 Pls. 2-14×1/2 Pls.	2-15 C 55 6-21×7/8 Pls. 4-14×9/16 Pls.	2-12 C 40 4-16×5/8 Pls. 2-11×11/16 Pls.	2-12 C 40 4-16×11/16 Pls. 2-11×13/16 Pls.	2-12 C 40 4-16×11/16 Pls. 2-11×11/16 Pls.	2-12 C 40 4-16×11/16 Pls. 2-11×11/16 Pls.		2-12 C 40 4-16×3/4 Pls. 2-11×3/4 Pls.	3-12 C 40 2-16×7/8 Pls. 2-16×13/16 Pls. 2-11×3/8 Pls.			2-15 C 40 4-14×5/8 Pls. 2-14×7/8 Pls.
6TH														
5TH	2-15 C 40 6-14×3/4 Pls. 4-14×11/16 Pls.	2-12 C 40 4-16×7/8 Pls. 4-11×1/2 Pls.	2-15 C 55 6-21×3/4 Pls. 6-14×9/16 Pls.	2-15 C 55 6-21×3/4 Pls. 6-14×9/16 Pls.	2-15 C 55 4-18×3/4 Pls. 6-14×3/4 Pls.	2-12 C 40 4-16×3/4 Pls. 2-11×5/16 Pls. 2-11×5/8 Pls.	2-12 C 40 4-16×3/4 Pls. 2-11×5/16 Pls. 2-11×1/2 Pls.	2-12 C 40 4-16×3/4 Pls. 2-11×5/16 Pls. 2-11×1/2 Pls.		2-12 C 40 4-16×5/8 Pls. 2-11×5/8 Pls. 2-11×11/16 Pls.	3-12 C 40 4-16×7/8 Pls. 3-11×13/16 Pls.			2-15 C 55 4-14×7/8 Pls. 3-14×13/16 Pls.
4TH														
3RD	2-16 C 40 6-14×7/8 Pls. 2-14×13/16 Pls. 2-14×7/8 Pls.	2-15 C 40 6-18×5/8 Pls. 2-14×7/16 Pls. 2-14×1/2 Pls.	2-16 C 56 6-21×3/4 Pls. 6-14×5/8 Pls.	2-16 C 55 6-21×7/8 Pls. 4-13×7/8 Pls. 1-14½×7/8 Pl. 4-6×4×1/2 Ls	2-16 C 65 6-18×3/4 Pls. 4-14×13/16 Pls. 2-14×3/4 Pls.	2-12 C 40 6-16×5/8 Pls. 2-11×11/16 Pls. 2-11×3/4 Pls.	2-12 C 40 6-16×5/8 Pls. 2-11×5/16 Pls. 2-11×3/4 Pls.	2-12 C 40 6-16×5/8 Pls. 2-11×5/16 Pls. 2-11×3/4 Pls.		2-12 C 40 6-16×11/16 Pls. 4-11×11/16 Pls.	3-12 C 40 6-18×7/8 Pls. 3-11×7/8 Pls.			2-16 C 40 6-14×3/4 Pls. 4-14×1/2 Pls.
2ND														
1ST	2-15 C 55 6-16×3/4 Pls. 2-14×13/16 Pls. 2-14×3/4 Pls.	2-15 C 55 6-21×3/4 Pls. 6-14×13/16 Pls.	2-15 C 55 6-21×7/8 Pls. 4-13×7/8 Pls. 1-14½×7/8 Pl. 4-6×4×5/8 Ls	2-16 C 55 6-21×7/8 Pls. 4-13×7/8 Pls. 1-14½×7/8 Pl. 4-6×4×1/2 Ls	2-15 C 55 6-18×7/8 Pls. 4-14×13/16 Pls. 2-14×7/8 Pls.	2-12 C 40 6-16×3/4 Pls. 2-11×13/16 Pls. 2-11×3/4 Pls.	2-12 C 40 6-18×3/4 Pls. 4-11×9/16 Pls.	2-12 C 40 6-16×3/4 Pls. 4-11×11/16 Pls.		2-12 C 40 6-16×3/4 Pls. 2-11×13/16 Pls. 2-11×7/8 Pls.	3-12 C 40 6-18×7/8 Pls. 3-11×7/8 Pls.			2-15 C 40 6-14×3/4 Pls. 4-14×11/16 Pls.
BSMT.								2-15 C 55 6-16×13/16 Pls. 4-14×7/8 Pls.						
S-BSMT.	2-15 C 55 6-18×1 Pls. 2-14×13/16 Pls. 2-14×7/8 Pls.	2-15 C 55 6-21×7/8 Pls. 6-13×7/8 Pls. 1-14½×7/8 Pl. 4-6×4×3/8 Ls	2-16 C 55 6-21×7/8 Pls. 4-13×7/8 Pls. 1-14½×7/8 Pl. 4-6×4×1/2 Ls	2-16 C 55 6-21×7/8 Pls. 4-13×7/8 Pls. 1-4½×7/8 Pl. 4-6×4×7/16 Ls	2-15 C 56 6-21×7/8 Pls. 4-13×7/8 Pls. 1-14½×7/8 Pl. 4-6×4×3/8 Ls	2-15 C 65 6-16×13/16 Pls. 2-14×3/8 Pls. 2-14×13/16 Pls.	2-18 C 65 6-16×3/4 Pls. 4-14×7/8 Pls.			2-15 C 55 6-16×7/8 Pls. 4-14×13/16 Pls.	2-15 C 55 6-18×3/4 Pls. 4-14×7/8 Pls.			2-16 C 65 6-16×3/4 Pls. 4-14×7/8 Pls.
SUBWAY														

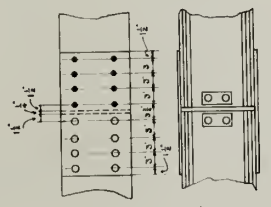


Detail of Splice in 4th Story For Hanger 8A
Detail For 26A, 39A and 42A Similar

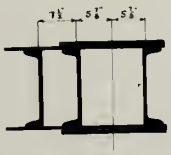
UNIVERSITY OF ILLINOIS

PLATE VIII
COLUMN SCHEDULE

FLOOR \ COL NO.	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Roof						2-12 C 25 2-14 × 5/16 Pls													
Attic			2-12 C 25 2-14 × 1/4 Pls	2-12 C 25 2-14 × 1/4 Pls	2-12 C 25 2-14 × 1/4 Pls	2-12 C 25 2-14 × 1/4 Pls	2-12 C 25 2-14 × 1/4 Pls	2-12 C 25 2-14 × 1/4 Pls	2-12 C 25 2-14 × 1/4 Pls	2-12 C 25 2-14 × 1/4 Pls	2-12 C 25 2-14 × 1/4 Pls	2-12 C 25 2-14 × 1/4 Pls	8-6×4×1/2 Ls 2-22 × 5/16 Pls	3-12 C 25 2-14 × 1/2 Pls	2-12 C 40 2-22 × 1/2 Pls GINDER	2-12 C 40 2-22 × 1/2 Pls GINDER	2-12 C 40 2-22 × 1/2 Pls GINDER	2-12 C 40 2-22 × 1/2 Pls 2-11 × 1/2 Pls GINDER	2-12 C 40 2-22 × 1/2 Pls 2-11 × 1/2 Pls GINDER
15 TH			2-12 C 25 2-14 × 5/16 Pls	2-12 C 25 2-14 × 5/16 Pls	2-12 C 25 2-14 × 1/4 Pls	2-12 C 30 2-14 × 5/16 Pls	2-12 C 25 2-14 × 5/16 Pls	2-12 C 30 2-14 × 3/8 Pls	2-12 C 25 2-14 × 3/16 Pls	2-12 C 25 2-14 × 5/16 Pls	2-12 C 25 2-14 × 1/4 Pls	2-12 C 25 2-14 × 1/4 Pls	8-5×3×1/2 Ls 2-12 × 5/8 Pls	3-12 C 40 2-14 × 1/2 Pls	8-5×3×1/2 Ls 2-12 × 5/8 Pls	8-5×3×1/2 Ls 2-12 × 5/8 Pls	8-5×3×1/2 Ls 2-12 × 5/8 Pls	8-5×3×1/2 Ls 2-12 × 5/8 Pls	8-5×3×1/2 Ls 2-12 × 5/8 Pls
14 TH																			
13 TH			2-12 C 35 2-14 × 5/8 Pls	2-12 C 35 2-14 × 5/16 Pls	2-12 C 25 2-14 × 5/16 Pls	2-12 C 40 2-14 × 5/16 Pls	2-12 C 35 2-14 × 5/16 Pls	2-12 C 40 2-14 × 3/8 Pls	2-12 C 40 2-14 × 5/8 Pls	2-12 C 35 2-14 × 5/8 Pls	2-12 C 40 2-14 × 5/16 Pls	2-12 C 40 2-14 × 1/16 Pls	8-6×4×1/2 Ls 2-12 × 5/8 Pls GINDER	3-12 C 40 4-14 × 1/16 Pls	8-6×4×1/2 Ls 2-12 × 5/8 Pls GINDER	8-6×4×1/2 Ls 2-12 × 5/8 Pls GINDER	8-6×4×1/2 Ls 2-12 × 5/8 Pls GINDER	8-6×4×1/2 Ls 2-12 × 5/8 Pls GINDER	8-6×4×1/2 Ls 2-12 × 5/8 Pls GINDER
12 TH						GINDER									3-12 C 40 4-14 × 1/2 Pls	3-12 C 40 4-14 × 1/16 Pls	3-12 C 40 4-14 × 5/8 Pls	3-12 C 40 4-14 × 1/16 Pls	3-12 C 40 4-14 × 5/8 Pls
11 TH			2-12 C 40 2-14 × 3/8 Pls 2-14 × 5/16 Pls	2-12 C 40 4-14 × 1/2 Pls	2-12 C 25 2-14 × 3/8 Pls	2-12 C 40 2-14 × 5/8 Pls	2-12 C 40 2-14 × 5/8 Pls	2-12 C 40 4-14 × 5/8 Pls	2-12 C 40 4-14 × 5/8 Pls	2-12 C 40 4-14 × 5/8 Pls	2-12 C 40 4-14 × 5/16 Pls	2-12 C 40 4-14 × 1/16 Pls	2-14 × 1/2 Pls 2-14 × 7/16 Pls 2-11 × 3/8 Pls	3-12 C 40 4-14 × 1/2 Pls					
10 TH																			
9 TH	28	28	2-15 C 40 4-14 × 1/2 Pls 2-14 × 5/16 Pls	2-12 C 40 4-14 × 5/16 Pls 2-11 × 1/2 Pls	2-12 C 30 2-14 × 1/2 Pls	2-12 C 40 4-14 × 5/16 Pls	2-12 C 40 4-14 × 5/8 Pls	2-12 C 40 4-14 × 5/16 Pls 2-11 × 1/2 Pls	2-12 C 40 4-14 × 5/16 Pls 2-11 × 1/2 Pls.	2-12 C 40 4-14 × 5/16 Pls 2-11 × 1/2 Pls.	2-12 C 40 4-14 × 5/8 Pls 2-11 × 1/2 Pls.	2-12 C 40 4-14 × 1/16 Pls 2-11 × 5/16 Pls	3-12 C 40 4-14 × 1/2 Pls 2-11 × 1/2 Pls.	3-12 C 40 4-14 × 1/2 Pls 1-11 × 1/16 Pl.	3-12 C 40 4-14 × 1/16 Pls 2-11 × 5/16 Pls	3-12 C 40 4-14 × 1/2 Pls 1-11 × 1/16 Pl.	3-12 C 40 4-14 × 1/2 Pls 1-11 × 5/16 Pl.	3-12 C 40 4-14 × 1/2 Pls 1-11 × 5/16 Pl.	3-12 C 40 4-14 × 1/2 Pls. 1-11 × 1/16 Pl.
8 TH																			
7 TH			2-15 C 40 4-14 × 5/16 Pls 2-14 × 5/16 Pls	2-12 C 40 4-14 × 5/16 Pls 2-11 × 11/16 Pls	2-12 C 35 2-14 × 5/8 Pls	2-12 C 40 4-14 × 3/8 Pls	2-12 C 40 4-14 × 1/2 Pls 2-11 × 3/8 Pls	2-12 C 40 4-16 × 5/16 Pls 2-11 × 3/8 Pls.	2-12 C 40 4-16 × 5/16 Pls 2-11 × 5/8 Pls.	2-12 C 40 4-16 × 11/16 Pls 2-11 × 5/8 Pls.	2-12 C 40 4-16 × 5/16 Pls 2-11 × 5/8 Pls.	2-12 C 40 4-16 × 5/16 Pls 4-11 × 5/8 Pls.	3-12 C 40 6-16 × 3/8 Pls 3-11 × 5/8 Pls.	3-12 C 40 4-16 × 3/8 Pls 2-11 × 3/8 Pls.	3-12 C 40 4-16 × 1/16 Pls 3-11 × 5/8 Pls.	3-12 C 40 4-14 × 1/2 Pls 2-11 × 3/8 Pls.	3-12 C 40 4-14 × 1/2 Pls 2-11 × 3/8 Pls.	3-12 C 40 4-16 × 3/8 Pls 2-11 × 3/8 Pls.	3-12 C 40 4-16 × 1/2 Pls. 2-11 × 3/8 Pls.
6 TH																			
5 TH	SAME AS COL.	SAME AS COL.	2-15 C 40 4-14 × 1/2 Pls 2-14 × 5/16 Pls 2-14 × 1/2 Pls	2-15 C 55 6-18 × 3/8 Pls 4-14 × 1/2 Pls	2-12 C 40 2-14 × 1/2 Pls	2-12 C 40 4-14 × 15/16 Pls	2-15 C 55 6-16 × 3/8 Pls 4-14 × 5/8 Pls	2-12 C 40 4-16 × 3/8 Pls 2-11 × 11/16 Pls 2-11 × 5/8 Pls	2-12 C 40 4-16 × 3/8 Pls 2-11 × 5/8 Pls 2-11 × 3/8 Pls	2-12 C 40 4-16 × 3/8 Pls 4-11 × 5/8 Pls	2-12 C 40 4-16 × 3/8 Pls 2-11 × 5/8 Pls	2-12 C 40 4-16 × 3/8 Pls 2-11 × 11/16 Pls 2-11 × 5/8 Pls	3-12 C 40 6-16 × 3/8 Pls 3-11 × 15/16 Pls	3-12 C 40 4-16 × 3/8 Pls 3-11 × 15/16 Pls	3-12 C 40 6-16 × 5/8 Pls 3-11 × 3/8 Pls	3-12 C 40 4-16 × 3/8 Pls 3-11 × 5/8 Pls	3-12 C 40 4-16 × 3/8 Pls 2-11 × 3/8 Pls.	3-12 C 40 4-16 × 3/8 Pls 3-11 × 15/16 Pls	3-12 C 40 4-16 × 3/8 Pls 3-11 × 15/16 Pls
4 TH																			
3 RD			2-15 C 40 6-14 × 3/8 Pls 2-14 × 5/16 Pls. 2-14 × 3/8 Pls	2-15 C 55 6-18 × 3/8 Pls 6-14 × 11/16 Pls	2-15 C 40 4-14 × 5/8 Pls	2-15 C 40 6-14 × 5/8 Pls TRUSS	2-15 C 55 6-18 × 3/8 Pls 4-14 × 3/8 Pls	2-12 C 40 6-16 × 15/16 Pls 4-11 × 15/16 Pls	2-12 C 40 6-16 × 3/8 Pls 4-11 × 3/8 Pls	2-12 C 40 6-16 × 3/8 Pls 4-11 × 15/16 Pls	2-12 C 40 6-16 × 3/8 Pls 2-11 × 15/16 Pls. 2-11 × 3/8 Pls	2-12 C 40 6-16 × 3/8 Pls 4-11 × 15/16 Pls	3-12 C 40 6-18 × 3/8 Pls 4-11 × 3/8 Pls	3-12 C 40 6-16 × 15/16 Pls 3-11 × 15/16 Pls	3-12 C 40 6-18 × 3/8 Pls 4-11 × 15/16 Pls	3-12 C 40 6-18 × 15/16 Pls 3-11 × 3/8 Pls.	3-12 C 40 6-18 × 15/16 Pls 3-11 × 15/16 Pls	3-12 C 40 6-18 × 15/16 Pls 3-11 × 3/8 Pls.	3-12 C 40 6-18 × 3/8 Pls 3-11 × 3/8 Pls.
2 ND			2-15 C 40 6-14 × 3/8 Pls 4-14 × 3/8 Pls	2-15 C 55 6-18 × 3/8 Pls 6-14 × 3/8 Pls	2-15 C 55 4-14 × 3/8 Pls 4-14 × 5/16 Pls	2-18 × 3/8 Pls 8-6×4×3/8 Ls 4-6×3/8 Pls 4-16 × 3/8 Pls	2-15 C 55 6-18 × 3/8 Pls 4-14 × 3/8 Pls	2-12 C 40 6-16 × 3/8 Pls 4-11 × 3/8 Pls	2-12 C 40 6-16 × 3/8 Pls 4-11 × 15/16 Pls	2-12 C 40 6-16 × 3/8 Pls 2-11 × 15/16 Pls 2-11 × 3/8 Pls	2-12 C 40 6-16 × 3/8 Pls 2-11 × 15/16 Pls 2-11 × 3/8 Pls	2-12 C 40 6-16 × 3/8 Pls 2-11 × 15/16 Pls 2-11 × 3/8 Pls	3-12 C 40 6-18 × 3/8 Pls 4-11 × 3/8 Pls	3-12 C 40 6-18 × 3/8 Pls 3-11 × 3/8 Pls.	3-12 C 40 6-18 × 3/8 Pls 4-11 × 15/16 Pls	3-12 C 40 6-18 × 3/8 Pls 3-11 × 3/8 Pls.	3-12 C 40 6-18 × 15/16 Pls 3-11 × 15/16 Pls	3-12 C 40 6-18 × 15/16 Pls 3-11 × 3/8 Pls	3-12 C 40 6-18 × 3/8 Pls 3-11 × 3/8 Pls.
1 ST			2-15 C 55 6-14 × 3/8 Pls 4-14 × 3/8 Pls	2-15 C 55 6-18 × 3/8 Pls 6-14 × 3/8 Pls	2-15 C 55 4-14 × 3/8 Pls 4-14 × 5/16 Pls	2-18 × 3/8 Pls 8-6×4×3/8 Ls 4-6×3/8 Pls 4-16 × 3/8 Pls	2-15 C 55 6-18 × 3/8 Pls 4-14 × 3/8 Pls	2-12 C 40 6-16 × 3/8 Pls 4-11 × 3/8 Pls	2-12 C 40 6-16 × 3/8 Pls 4-11 × 15/16 Pls	2-12 C 40 6-16 × 3/8 Pls 2-11 × 15/16 Pls 2-11 × 3/8 Pls	2-12 C 40 6-16 × 3/8 Pls 2-11 × 15/16 Pls 2-11 × 3/8 Pls	2-12 C 40 6-16 × 3/8 Pls 2-11 × 15/16 Pls 2-11 × 3/8 Pls	3-12 C 40 6-18 × 3/8 Pls 4-11 × 3/8 Pls	3-12 C 40 6-18 × 3/8 Pls 3-11 × 3/8 Pls.	3-12 C 40 6-18 × 3/8 Pls 4-11 × 15/16 Pls	3-12 C 40 6-18 × 3/8 Pls 3-11 × 3/8 Pls.	3-12 C 40 6-18 × 15/16 Pls 3-11 × 15/16 Pls	3-12 C 40 6-18 × 15/16 Pls 3-11 × 3/8 Pls	3-12 C 40 6-18 × 3/8 Pls 3-11 × 3/8 Pls.
B SMT			2-15 C 55 6-14 × 3/8 Pls 4-14 × 3/8 Pls	2-15 C 55 4-21 × 3/8 Pls 4-13 × 5/16 Pls 1-14 × 5/16 Pl 4-6×4×3/8 Ls	2-18 C 55 4-16 × 3/8 Pls 4-14 × 5/16 Pls	2-18 × 3/8 Pls 8-6×4×3/8 Ls 4-6×3/8 Pls 4-16 × 3/8 Pls GINDER	2-15 C 55 6-12 × 3/8 Pls 6-14 × 3/8 Pls	2-15 C 55 6-16 × 3/8 Pls 4-11 × 3/8 Pls	2-15 C 55 6-16 × 3/8 Pls 4-14 × 3/8 Pls	2-15 C 55 6-16 × 3/8 Pls 2-14 × 3/8 Pls 2-14 × 5/16 Pls	2-15 C 55 6-16 × 15/16 Pls 2-14 × 3/8 Pls 2-14 × 15/16 Pls	2-15 C 55 6-16 × 1 Pls 2-14 × 15/16 Pls 2-14 × 3/8 Pls	2-15 C 55 6-18 × 1 Pls 6-14 × 3/8 Pls	2-15 C 55 6-18 × 3/8 Pls 4-14 × 3/8 Pls	2-15 C 55 6-18 × 1 Pls 4-14 × 15/16 Pls	2-15 C 55 6-18 × 15/16 Pls 4-14 × 15/16 Pls	2-15 C 55 6-18 × 3/8 Pls 2-14 × 3/8 Pls 2-14 × 15/16 Pls	2-15 C 55 6-18 × 3/8 Pls 4-14 × 3/8 Pls
SUBWAY						GINDER 4-12 C 40 8-14 × 3/8 Pls 4-11 × 3/8 Pls													



Typical Column Splice



Column 25
12th to 15th Floors

Column 1.
Sub-Basement Story

FLOOR \ COL NO	55	7A	8A	10A	23A	26A	39A	OLD COL 9-24	42A	56	6B	7B	54B	55B	58B	59B	OLD COL 25	55A	55C
Roof	2-12 C 25 2-14 × 5/16 Pls	2-12 C 25 2-14 × 1/2 Pls		2-12 C 30 2-14 × 1/2 Pls	2-12 C 25 2-14 × 1/2 Pls	2-12 C 25 2-14 × 1/2 Pls	2-12 C 25 2-14 × 1/2 Pls		2-12 C 26 2-14 × 1/2 Pls	2-12 C 25 2-14 × 5/16 Pls	2-10 C 20 2-12 × 1/2 Pls	2-10 C 20 2-12 × 1/2 Pls	2-10 C 20 2-12 × 1/2 Pls	2-10 C 20 2-12 × 1/2 Pls	2-10 C 20 2-12 × 1/2 Pls	2-10 C 20 2-12 × 1/2 Pls		2-6×4×1/2 Ls 2-12 × 5/16 Pls	2-15 C 33 2-18 × 5/16 Pls
Attic	2-12 C 25 2-14 × 3/8 Pls	2-12 C 25 2-14 × 1/2 Pls		2-12 C 30 2-14 × 1/2 Pls	2-12 C 25 2-14 × 1/2 Pls	2-12 C 25 2-14 × 5/16 Pls	2-12 C 25 2-14 × 5/16 Pls		2-12 C 30 2-14 × 1/2 Pls	2-12 C 35 2-14 × 5/16 Pls	2-10 C 20 2-12 × 1/2 Pls	2-10 C 20 2-12 × 5/16 Pls	2-10 C 20 2-12 × 1/2 Pls	2-10 C 20 2-12 × 5/16 Pls	2-10 C 20 2-12 × 5/16 Pls	2-10 C 20 2-12 × 1/2 Pls			2-15 C 40 4-18 × 1/2 Pls
15 TH																			
14 TH	2-12 C 40 2-14 × 3/8 Pls 2-14 × 5/16 Pls	2-12 C 25 2-14 × 5/16 Pls		2-12 C 25 2-14 × 3/8 Pls	2-12 C 35 2-14 × 5/8 Pls	2-12 C 60 2-14 × 5/16 Pls	2-12 C 40 2-14 × 1/2 Pls		2-12 C 30 2-14 × 5/16 Pls	2-12 C 40 4-14 × 1/2 Pl.	2-10 C 20 2-12 × 5/16 Pls 3" PLATE	2-10 C 20 2-12 × 5/16 Pls 3" PLATE	2-10 C 20 2-12 × 5/16 Pls 3" PLATE	2-10 C 25 2-12 × 5/16 Pls 3" PLATE	2-10 C 20 2-12 × 5/16 Pls 3" PLATE	2-10 C 20 2-12 × 5/16 Pls			2-18 C 55 4-18 × 15/16 Pls
13 TH																			
12 TH	2-12 C 40 2-14 × 3/8 Pls 2-14 × 5/16 Pls	2-12 C 30 2-14 × 5/16 Pls		2-12 C 35 2-14 × 3/8 Pls	2-12 C 40 4-14 × 1/2 Pls	2-12 C 40 2-14 × 15/16 Pls	2-12 C 40 2-14 × 3/8 Pls		2-12 C 40 2-14 × 5/8 Pls	2-12 C 40 4-14 × 1/2 Pls	4-4×4×1/2 Ls LATT.	4-4×4×1/2 Ls LATT.	4-4×4×1/2 Ls LATT.	4-6×4×1/2 Ls LATT.	4-4×4×1/2 Ls LATT.	4-6×4×1/2 Ls LATT.			2-15 C 65 4-18 × 15/16 Pls
11 TH																			
10 TH	2-12 C 40 2-14 × 1/2 Pls 2-14 × 5/16 Pls	2-12 C 40 2-14 × 5/8 Pls 2-14 × 5/16 Pls		2-12 C 35 2-14 × 5/16 Pls	2-12 C 40 2-14 × 5/8 Pls	2-12 C 40 4-14 × 1/2 Pls 2-11 × 5/8 Pls	2-12 C 40 2-14 × 1/2 Pls 2-14 × 1/2 Pls		2-12 C 40 2-14 × 5/8 Pls 2-14 × 1/2 Pls	2-12 C 40 4-14 × 1/2 Pls	4-4×4×1/2 Ls LATT.	4-4×4×1/2 Ls LATT.	4-4×4×1/2 Ls LATT.	4-6×4×1/2 Ls LATT.	4-4×4×1/2 Ls LATT.	4-4×4×1/2 Ls LATT.			2-15 C 55 4-18 × 15/16 Pls
9 TH																			
8 TH	2-12 C 40 2-14 × 3/8 Pls 2-11 × 5/8 Pls	2-12 C 40 2-14 × 3/8 Pls 2-14 × 5/16 Pls	TRUSS	2-12 C 40 2-14 × 3/8 Pls	2-12 C 40 4-14 × 5/8 Pls 2-11 × 15/16 Pls	2-12 C 40 2-14 × 3/8 Pls 2-14 × 15/16 Pls	2-12 C 40 4-14 × 5/8 Pls 2-11 × 5/8 Pls	TRUSS	2-12 C 40 4-14 × 15/16 Pls 2-11 × 5/16 Pls	4-4×4×1/2 Ls LATT.	4-4×4×1/2 Ls LATT.	4-4×4×1/2 Ls LATT.	4-6×4×1/2 Ls LATT.	4-4×4×1/2 Ls LATT.	4-4×4×1/2 Ls LATT.			2-15 C 55 4-18 × 3/8 Pls 2-14 × 5/8 Pls
7 TH																			
6 TH						TRUSS													
5 TH	2-12 C 40 4-14 × 3/8 Pls 2-11 × 5/8 Pls	2-12 C 40 4-14 × 5/16 Pls 2-11 × 3/8 Pls	Hanger 1-16 × 1/2 Pl. 4-6×4×3/8 Ls	2-12 C 40 4-14 × 3/8 Pls	2-12 C 40 4-14 × 3/8 Pls 4-11 × 15/16 Pls	Hanger 1-16 × 1/2 Pl. 4-6×4×3/8 Ls	Hanger 1-16 × 1/2 Pl 4-6×4×3/8 Ls		Hanger 1-16 × 1/2 Pl. 4-6×4×3/8 Ls	2-12 C 40 4-14 × 15/16 Pls 2-11 × 5/8 Pls	4-4×4×1/2 Ls LATT.	4-4×4×1/2 Ls LATT.	4-4×4×1/2 Ls LATT.	4-6×4×1/2 Ls LATT.	4-4×4×1/2 Ls LATT.	4-4×4×1/2 Ls LATT.			2-15 C 55 4-18 × 3/8 Pls 2-14 × 3/8 Pls
4 TH																			
3 RD	2-12 C 40 4-16 × 3/8 Pls 4-11 × 5/8 Pls	2-15 C 40 4-14 × 5/8 Pls 2-14 × 5/16 Pls	1-16 × 1/2 Pl. 4-6×4×1/2 Ls	2-15 C 40 2-14 × 3/8 Pls 2-14 × 5/16 Pls	2-15 C 40 4-14 × 15/16 Pls 4-14 × 15/16 Pls	1-16 × 1/2 Pl. 4-6×4×1/2 Ls	1-16 × 1/2 Pl 4-6×4×1/2 Ls	1-16 × 1/2 Pl 4-6×4×1/2 Ls	2-15 C 40 6-14 × 3/8 Pls 2-14 × 5/16 Pls.									2-15 C 55 6-18 × 3/8 Pls 4-14 × 3/8 Pls.
2 ND		TRUSS		TRUSS	TRUSS					TRUSS									
1 ST	2-12 C 40 4-16 × 3/8 Pls 4-11 × 5/8 Pls	2-12 C 25 2-12 × 5/16 Pls		2-12 C 25 2-12 × 5/16 Pls	2-12 C 25 2-12 × 5/16 Pls	2-12 C 25 2-12 × 3/8 Pls	2-12 C 25 2-12 × 3/8 Pls		2-12 C 25 2-12 × 3/8 Pls	2-18 × 3/8 Pls 8-6×4×3/8 Ls 4-6×3/8 Pls 4-16 × 3/8 Pls							2-12 C 25 2-12 × 3/8 Pls	2-15 C 55 6-18 × 3/8 Pls 4-14 × 3/8 Pls.
B SMT																			
S-B SMT	2-12 C 40 4-16 × 15/16 Pls 4-11 × 15/16 Pls	2-12 C 35 2-12 × 5/16 Pls		2-12 C 30 2-11 × 15/16 Pls 4-12 × 15/16 Pls	2-12 C 30 4-12 × 3/8 Pls	2-12 C 30 4-12 × 15/16 Pls	2-12 C 30 4-12 × 15/16 Pls	2-10 C 35 4-12 × 3/8 Pls 2-9 × 3/8 Pls	2-12 C 30 4-12 × 3/8 Pls	2-18 × 3/8 Pls 8-6×4×3/8 Ls 4-6×3/8 Pls 4-16 × 3/8 Pls GINDER 4-12 C 40 2-12 × 15/16 Pls 4-11 × 3/8 Pls							2-10 C 35 4-12 × 3/8 Pls.	2-12 C 30 2-12 × 3/8 Pls	2-15 C 55 6-18 × 3/8 Pls 4-14 × 3/8 Pls
SUBWAY																			

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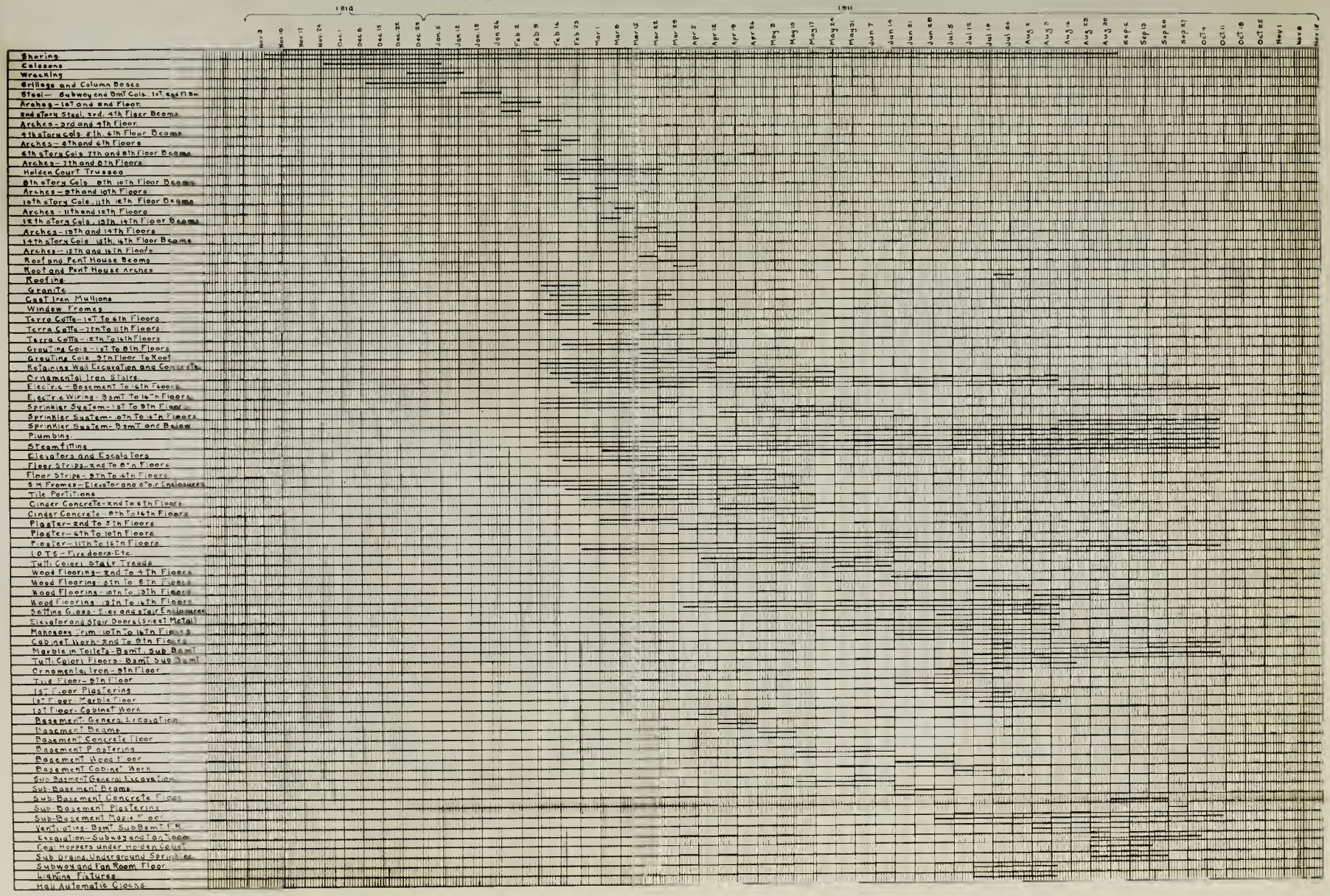
PLATE IX

CHART SHOWING TIME ALLOTTED SUB-CONTRACTS



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rivets. The two important defects were loose rivets and imperfect heads.

On this work, the men worked in one shift of eight hours, except in the basement and lower levels, where they worked in three shifts of eight hours each, including Sundays and holidays. See Plate IX.

RETAINING WALLS AND RETAINING-WALL TRENCHES.

Retaining walls consisting of I-beams imbedded in concrete were located on Madison Street, under the north party wall, and under the west wall of the Wabash Avenue building. This work included the walls on both sides of the coal-receiving hopper-trench. See Plate I. Before the trenches for these walls had been opened, the steel construction, with the exception of the basement and sub-basement floor-beams, was in place and riveted, up to an including the first floor.

As the retaining-wall trenches were excavated, matched and dressed 3-inch lagging in 3-foot lengths was lined on both sides of the trench as soon as the proper depth had been reached. Each set of lagging was braced and set in place with two horizontal wood stringers and was forced apart and held firmly against the lagging with screws and drums in such a manner as to prevent any bulging movement in the surrounding soil. The jackscrews were always kept thoroughly tightened and were so placed that both the vertical and horizontal steel members and any other steel which was re-

quired in the walls could be set without moving or changing the position of the screws. Where required, the jackscrews were placed to allow for the installation of the vertical supports for the inner form. The inner form for the retaining-walls was used in the north party-wall and in the coal-receiving hopper-trench. The excavation for all deep trenches was carried on in sections, each section being completed and the concrete given sufficient time to set before an adjoining section was opened.

When the excavation and the lagging had been carried to the proper depth—which is to hard-pan—and the bottom of the trench had been approved by the superintendent, the bottom layer of concrete was poured in. This layer was about 2 feet thick. After this layer had been leveled and tamped and had sufficiently hardened, the steel framing was lowered and set securely in place by the steel erector. Where an inner form was required, vertical timbers were lined up and braced both on top and bottom, the plank forms being built inside the bracing. These braces were shifted immediately before the concrete was poured. As soon as the structural steel work had been properly secured the concrete filling was poured and brought to the height of one side of the lagging and was allowed to set for twelve hours before the next layer was poured. The upper surface of each layer of concrete was roughened to facilitate the bonding of the new and old concrete. The drums, jackscrews, and stringers were removed from the trenches as soon as the concrete was poured. This work was very carefully done in such a manner that no movement in the surrounding soil could take place. The concrete used for these trenches was in a quaking condition, so that it could be thoroughly puddled and worked into the

spaces between the lagging and the steel.

A system of tile-drainage outside of the retaining walls on both Madison and State Streets, along the north party-wall and along the west wall of the Wabash Avenue building, was installed in connection with the deep basement retaining-walls. This excluded moisture from all exterior walls of the new building. The tiles used were 4-inch vitrified tile, laid without mortar in board troughs, built of 12-inch planks, each 16 feet long. The height of these troughs was 6 inches. The boards were notched at intervals of 2 feet at the corners, and were placed about 12 inches below the basement floor-line. The tiles were laid in continuous lengths and drained into branches of 4-inch cast-iron pipe, extending every 40 feet through the wall into the basement. They were left with open ends for the plumber's connections. As fast as the tiles were laid, they were covered, and a space of 6 inches outside of the walls was filled with crushed stone, brought to the underside of the adjoining basement floors or to the underside of the street paving.

GENERAL EXCAVATION AND CONSTRUCTION OF THE SUB-BASEMENT AND LOWER LEVELS.

As soon as the retaining walls were brought to the proper height—which is just under the first floor—the walls were loaded onto the new steel. All braces, drums, and jackscrews

were removed. The building was then ready for the general excavation of the sub-basement and lower levels. It should also be stated that work was also being done on the first and succeeding floors. By consulting Plate IX. one can see that the general excavation and the concreting of the lower floors required as much time as the finishing of the rest of the building. On both the general excavation and the retaining-wall excavation and concreting, three shifts of workmen were employed, each shift working eight hours, Sundays and holidays being included.

The retaining walls were securely braced at the top, and the excavation was carried to a point far enough below the basement floor-level to secure sufficient room for the basement structural floor-beams and girders. The basement-floor construction, including all structural steel-work and the reinforced concrete arches, was installed and given sufficient time to thoroughly set before the excavation was carried to a deeper level. As the excavation of the core was continued, the retaining walls were braced across the entire space. In this bracing the steel construction was used as far as possible in combination with the drums and jackscrews, so that no possible movement could take place. Each intermediate floor or balcony was completely installed, and allowed to thoroughly set before the excavation was carried below the level required for the installation of the permanent floor work. Substantial bracing extending entirely across the space excavated was installed as the excavation was carried down. The braces remained in place and were kept in full compression by the workmen until the concrete struts and the subway floor-construction had been installed and had thoroughly set. All bracing

was so installed that no settlement in the adjoining streets and properties was incurred. All old building foundations and similar obstacles were removed. All old steel-work which formed a part of the old foundation was freed from earth and masonry, and was removed to the salvage yard. All other materials of excavation were removed through the Illinois Tunnel Company's subway. Arrangements were made with this company for the installation of a stub on State Street, on Madison Street, and on Holden Court, so that work could be conducted from at least three points at the same time. Between columns 23 and 26, a core of earth was left below the 2nd. sub-basement floor, in order to support the temporary retaining-wall between the north and south sections until the excavation in the south section had been carried to that level. See Plate V.

Reinforced-Concrete Struts.

Reinforced-concrete struts, extending entirely across the space occupied by the subway floor from retaining-wall to retaining-wall, were installed on column center lines. See Plate V. The struts were located under the reinforced floors of the 2nd. sub-basement, fan room, air washer room, boiler room, and under the coal conveyor trench and coal storage room. Under the north Wabash Avenue building, new struts were required to replace the old ones which were removed on account of the new ash pits, conveyor trenches, and foundations. These struts were about 3 feet wide and 6 feet long. The percentage of reinforcement was 0.75 ,

and 1-inch deformed bars were used. Each strut was completly installed in one operation,without interruption. As the trenches for the struts were opened, the banks were trimmed to the proper size. Where the earth showed a tendency to slide and cave in and where required on account of soft clay, the sides were braced with lagging the same as for the deep trenches. As soon as the trenches had been excavated and the reinforcement set in place, the concrete was poured and was throughly worked and tamped to form a solid,dense mass. The proportions used for the concrete were the same as those for the caissons and retaining-walls. Steps were cut in the sides of the caisson in order to form a solid bearing for the ends of the struts. The reinforcing rods extended into this recess. The existing struts which crossed the new conveyor trench were trimmed to a smooth regular surface. Under the trench,extending north and south under Holden Court, the struts were pitched at the bottom, so that the pressure would be carried underneath the trench and be distributed along the construction members.

Conveyor Trenches.

The walls of the receiving hopper-trench under Holden Court were built of steel and concrete the same as the retaining walls; but the trench running east and west under the north Wabash Avenue building was built of reinforced concrete. The reinforcement was the same as that required for the struts. The sides and bottom of this trench were built at the same time. This trench

was installed in connection with the ash-pits under the boilers. The reinforcing rods of both the conveyor-trench and the ash-pits overlapped each other. This allowed the use of continuous supports. Short sections having a length of 8 feet were built at one time. The rods and the concrete were put in in a manner similar to that used for the struts. Before the bottom had thoroughly hardened, it was finished with one-half-inch top-dressing, composed of 1-1/2 parts of lakeshore sand to 1 part of Portland cement. Each section was allowed to stand for forty-eight hours before the adjoining section was opened, and the temporary bracing was kept in place until permission was obtained from the superintendent for its removal. The sections were then joined together and the trench completed.

General Floor-Construction in Basement and Lower Levels.

As the lower levels were being excavated, the higher ones were being completed. Tile arches, cinder concrete, and a maple floor were used for the floor-construction of all levels except the 2nd. sub-basement, subway, fan-rooms, etc. In the case of the lowest levels, the floor consisted of 2 inches of cinder concrete laid on hollow tile which was 16 inches thick. On top of the cinder-concrete rested a layer of stone-concrete 6 inches thick. The proportions for both the stone and cinder concrete were 1:2:4. The concrete used for the floor-construction was mixed at a normal consistency, as concrete is stronger when dry than when it is in a quaking condition. However, this required a greater amount of tamping. On top of the stone concrete rested a three-fourth-inch lay-

er of cement, consisting of 1 part cement to 1-1/2 parts of lake-shore sand. The floor-construction in all other levels was a trifle different. Floor-sleepers, spaced 2 feet apart, rested upon the tile arches. Cinder concrete was then poured and was thoroughly worked and tamped so that the floor-sleepers would be solid. On top of this construction rested two thicknesses of tarred paper. A maple floor was then laid.

BRICKWORK, TERRA-COTTA, AND FIREPROOFING.

One of the big items in the construction of this building was the brickwork. The bricks used were sound, thoroughly burned, common bricks. The architects specifications required them to be free from lime and from all other defects. The bricks were laid up with close, shoved joints, each brick being thoroughly incased in mortar one-quarter of an inch thick. No brick walls were built having a thickness of less than 8 inches. The bond in common brick was one header to every four strechers. When common bricks were laid in hot weather, the bricks were thoroughly wetted; and when these bricks were laid in cold weather, they were heated and the masonry was protected until the mortar had hardened. Where bricks formed a backing for granite, cut stone or terra-cotta facings, the brickwork was forced into the cavities with sufficient mortar so that all holes and openings in these faces were filled. This method formed a solid wall. Where steel columns occurred in brick

walls, the brickwork extended entirely around the columns at a distance of 2 feet from the farthest projecting point of the steel. This space was afterward filled with concrete. The inner 4 inches of all interior walls were laid with hollow bricks having two holes. In the penthouses, this kind of brick was used to reduce the load bearing on the roof, and in interior walls, it was used to dry out the wall and to form a bond of plaster. The same specifications applied to these bricks as applied to the common bricks. The outer course of all penthouse and tankhouse walls was laid with #2 light gray, kittanning brick,laid in colored mortar. These bricks were bonded into the backing bricks by using one header to four strechers. The face of the wall of both the north and south sections over Holden Court consisted of white glazed bricks—English size. The bricks were laid up with white mortar joints one-eighth of an inch thick. They were laid with strecher courses, and were bonded to the backing by means of clips. The specifications required that the contractor guarantee these bricks against all defects of discoloration, glazing, and scaling for a period of eighteen months after the completion of the contract.

The specifications for fireproofing required that all floors, elevator shafts, stairwells, and partitions be fireproofed with hollow tile. For floors, the tiles were 16 inches thick and for all other places they were 8 inches thick. The same mortar was used here as for the common brick.

Cream colored terra-cotta was used on the faces of the building on State Strret and on Madison Street. This facing was tied to the brick backing both by means of clips and by running the brick backing into the cavities of the facing.

CONTRACT PRICES.

The foregoing has been a discussion of all the important construction feature of the building. The work which remained to be done was on the interior and therefore of little importance to this thesis. Be referring to Plate IX. one can readily determine the time required to complete the various sub-contracts. This item was closely related to the cost of construction. As the cost is necessarily a prime factor in all projects of such magnitude as the one under consideration, a table is appended herewith in order that the reader may have adequate knowledge regarding this feature of the work.

Item.	Cost.
Steel	$600,000
Terra-Cotta	125,000
Shoring	30,000
Fireproofing	190,000
Masonry	400,000
Concrete and Paving	120,000
Prismatic Light and Sidewalk	10,000
Sheet Metal	130,000
Plastering	105,000
Electric Wiring	80,000
Ventilating	70,000
Heating (No boilers)	50,000
Plumbing	50,000
Ornamental-Iron	100,000
Glass	20,000
Cabinet Work	80,000
Carpentry	53,000
Marble	40,000
Art Marble	40,000
Iron, Other than Structural	50,000
Elevators	200,000
Total	2,473,000

UNIT PRICES.

Item.	Remarks.	Unit Price.
Caisson	Including Concreting	$0.55 per Cu.ft.
General Excavation		$2.35 per Cu.yd.
Retaining-Wall Excavation		$5.00 per Cu.yd.
Retaining-Wall Concrete		$5.20 per Cu.yd.
Brick		$14.00 per 1000.
Wood Flooring	Includes maple floor, sleepers and cinder concrete.	$0.25 per sq.ft.
Marble Floor	Includes 2" concrete bed	$0.62 per sq.ft.
Art Marble Floor	Includes 2" concrete bed	$0.50 per sq.ft.
Tile Partition	Large Quantities	3" tile $0.12 and 4" tile $0.13 per sq.ft.
Tile Arches	Large Quantities	$0.30 per sq.ft.
Plastering		$0.40 per sq.yd.

CONCLUSIONS.

The construction of this department store in the heart of a great city has aroused considerable interest in the building world. The main reason for this was the peculiar conditions under which work had to be done. As previously stated, the building had

to be constructed in two section in order that trade would not be affected any more than was absolutely necessary. This necessitated the use of a temporary retaining-wall which completely separated the two sections and also held enormous earth pressures. The fact that the building was supported on cribbing while the caisson excavation was going on was another noteworthy feature. Still another important factor was the loading of the building onto the new steel while the general excavation was going on. All of these special methods of construction added considerably to the cost, which was approximately $2,500,000. However, the engineering projects which arouse the most interest are those which are done under difficulties, difficulties which test the skill of the trained engineer. Such projects afford the student of building construction valuable information for study.

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